

EXECUTIVE SUMMARY

The City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water), is proposing to implement a Habitat Conservation Plan (HCP) for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) (Preble's), listed as threatened under the Endangered Species Act of 1973, as amended (50 *Federal Register* 26517-26530, 1998). The plan is needed because Denver Water is seeking an Incidental Take Permit from the U.S. Fish and Wildlife Service for activities necessary to operate and maintain its water system that could affect occupied or potential Preble's habitat on its property, as defined in the HCP. The incidental take permitting process is required under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended. To ensure compliance with the Incidental Take Permit (ITP), Denver Water Board must submit an HCP that specifies impacts that are likely to result from the taking of habitat, and the measures implemented to avoid, minimize, and mitigate the impacts.

This Environmental Assessment examines in detail two alternatives: No Action and the Denver Water Board Preferred Alternative. The Preferred Alternative includes acquiring an ITP for a term of 30 years to cover activities including those with insignificant levels of take, operations and maintenance, foreseeable activities, and adaptive management strategies. The HCP would designate conservation zones with the goals of: (1) preventing disturbance to occupied and potential habitat through avoidance, minimization, and utilization of Best Management Practices when practicable; and (2) replacing occupied and potential habitat that is disturbed or removed by implementing Best Management Practices and mitigation measures.

Under the Preferred Alternative, both temporary and permanent take of Preble's or its habitat are anticipated. The HCP states that for the duration of the ITP (30 years), Denver Water may take a total of 75 acres of Preble's habitat, of which up to 10 acres may be permanent (i.e., 65 acres of temporary and 10 acres of permanent take, the worst case scenario). However, Denver Water anticipates that the covered activities in the HCP would result in less than one acre of permanent take and less than 74 acres of temporary take (the best case scenario). The HCP identifies specific mitigation measures that would create, preserve, or enhance a combination of both riparian and floodplain habitat required by Preble's, totaling anywhere from approximately 2.5 acres to 72 acres to offset permanent take depending on the scenario. In addition, no more than 25 acres of temporary take may occur at any one time under the Preferred Alternative.

The Preferred Alternative would have no or negligible impacts to geology and soils, water resources, federally listed species in the central Platte River ecosystem, general wildlife, air quality, prime and unique farmlands, ecologically critical areas, Wild and Scenic Rivers, other unique areas, Indian Trust resources, ethnographic resources, the socioeconomic environment, and environmental justice.

There would be short- and long-term, local, minor to moderate, beneficial impacts to Denver Water Board operations. Under the best case scenario of the Preferred Alternative, short-term, negligible, adverse impacts to wetland, riparian, and aquatic resources are anticipated from the

temporary disturbances, while long-term, minor, beneficial effects would occur from the permanent disturbance. Under the worst case scenario, short-term impacts to wetland, riparian, and aquatic resources are anticipated to be negligible to minor from temporary disturbances. Long-term, minor to major beneficial effects would occur depending on the level of mitigation.

Under the best case scenario, short-term, negligible to minor, adverse impacts to upland floodplain plant communities from temporary disturbances would be anticipated, while permanent disturbances would result in short-term, minor, adverse impacts, until restoration of the site was complete. A long-term, negligible to minor, beneficial effect would occur as a result of mitigation required in this scenario. Under the worst case scenario, short-term impacts are anticipated to be minor to moderate and adverse, depending on how much permanent disturbance actually occurs. A long-term, minor to major, beneficial effect on upland floodplain plant communities would be expected depending on whether the minimum or maximum amount of mitigation occurs.

A determination of effect, as required by the Endangered Species Act, has been made for federally-listed threatened, endangered, proposed, and candidate species. However, Denver Water's HCP does not cover take for the species other than Preble's. The determination of effect for Preble's would be may affect/likely to adversely affect under the Preferred Alternative. The determination of effect for the bald eagle, Pawnee montane skipper, Ute ladies' tresses, black-tailed prairie dog, Canada lynx, Mexican spotted owl, mountain plover, greenback cutthroat trout, and the Colorado butterfly plant would be no effect under the Preferred Alternative. It should be noted that if impacts to any of these species become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Endangered Species Act.

For cultural resources, including historic and archaeological resources, there could be findings of no historic properties affected, no adverse effect, or historic properties are adversely affected. Denver Water will work with State Historic Preservation Office to draft an agreement that addresses and mitigates adverse effects to cultural resources.

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
Denver Water	The City and County of Denver, acting by and through its Board of Water Commissioners
Act	Endangered Species Act
FR	Federal Register
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
NEPA	National Environmental Policy Act of 1969, as amended
NRHP	National Record of Historic Places
Preble's	Preble's Meadow Jumping Mouse
Service	United States Fish and Wildlife Service
SHPO	State Historic Preservation Office
U.S.	United States
USC	United States Code

1.0 INTRODUCTION

1.1 BACKGROUND

In 1998, the U.S. Fish and Wildlife Service (Service) listed the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) (Preble's) as threatened under the Endangered Species Act of 1973, as amended (50 *Federal Register* (FR) 26517-26530, 1998) (Act). Section 9(a)(1)(B) of the Act states that "...with respect to any endangered species of fish or wildlife listed pursuant to section 4 of this Act it is unlawful for any person subject to the jurisdiction of the United States to take any such species within the United States or the territorial sea of the United States." As defined under the Act, take means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water) owns property within occupied and potential Preble's habitat¹, and conducts activities to operate and maintain its water supply system that may affect Preble's. Therefore, they are subject to the incidental take provisions of the Act.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

Denver Water is considering implementation of a Habitat Conservation Plan (HCP) for Preble's. The primary purpose of the HCP is to satisfy the permitting and compliance requirements of the Act, enabling Denver Water to continue activities necessary to operate and maintain its water system while meeting its mission (see Section 1.3, Denver Water Board Mission). Other purposes include describing the goals and objectives of Denver Water to secure the long-term conservation of occupied and potential Preble's habitat, and providing the Service with a tool to minimize and mitigate the take of occupied and potential Preble's habitat (Denver Water 2003).

The HCP is needed because Denver Water is seeking an Incidental Take Permit (ITP) from the Service for activities to operate and maintain its water supply system that could affect occupied or potential Preble's habitat on its property. The ITP permitting process requires Denver Water to submit an HCP that specifies impacts that are likely to result from the taking of habitat, and the measures implemented to avoid, minimize, and mitigate the impacts. The HCP process and its relation to ITPs, the Act, and the National Environmental Policy Act of 1969, as amended (NEPA), is described in more detail in Section 1.4.2, Habitat Conservation Planning and NEPA Process.

An Environmental Assessment (EA) analyzes the proposed action and alternatives and their potential impacts on the environment. This EA has been prepared in accordance with NEPA, regulations of the Council on Environmental Quality (40 *Code of Federal Regulations* (CFR) 1508.9), and the Service's NEPA Handbook.

¹ As defined in the HCP (see also Section 1.4.2, Baseline Preble's Meadow Jumping Mouse Habitat on Denver Water Properties, and Chapter 6.0, Glossary, of this EA).

1.3 DENVER WATER BOARD MISSION

The mission of Denver Water is to provide its City of Denver customers and its contract distributors (i.e., entities with contracts to receive either treated or raw water supplies) with high-quality water and excellent service at the lowest possible price. The Denver Water service area is clearly defined as the combined service area (**Figure 1**) comprised of the City of Denver and 78 suburban contract distributors. Denver Water has committed to serve the build-out needs of this area, and also provide limited amounts of water to certain entities outside of the combined service area. This approach makes it manageable for Denver Water to estimate the water needs of its customers and contract distributors, which is accomplished through a process of Integrated Resource Planning (Denver Water 2002).

1.4 PROJECT BACKGROUND

1.4.1 Preble's Meadow Jumping Mouse Listing History and Status

Procedures for listing Preble's under the Act were begun in 1985 and completed in 1998. As discussed in Section III.A of the HCP, Denver Water has been operating and maintaining its water system prior to listing of Preble's as a threatened species. Denver Water also believes that the threats identified in the Preble's listing package are not related to its activities (see Section III.A of the HCP).

The following summary highlights the *Federal Register* notifications published and other concerns raised during the listing process:

- The Service included Preble's as a Category 2 candidate species (taxa for which current information indicated that proposing to list as endangered or threatened is possible, but appropriate or substantial biological information was not on file to support an immediate rulemaking) in the 1985 Animal Notice of Review (50 FR 37958).
- This status was retained in subsequent notices published in the *Federal Register* during 1989, 1991, and 1994 (54 FR 554, 56 FR 58810, and 59 FR 58982).
- On 16 August 1994, the Service received a petition from the Biodiversity Legal Foundation to list Preble's as endangered or threatened throughout its range in Colorado and Wyoming, and to designate critical habitat.
- On 15 March 1995 (60 FR 13950), the Service published notice of the 90-day finding that the petition presented substantial information indicating that listing Preble's may be warranted, and requested comments and biological data on the status of the mouse.
- In 1996, the Service discontinued the practice of maintaining a list of Category 2 species, and Preble's did not appear in the 28 February 1996 Notice of Review (61 FR 7596); it did not meet the requirements for the revised candidate species designation (those proposed for designation as endangered or threatened).

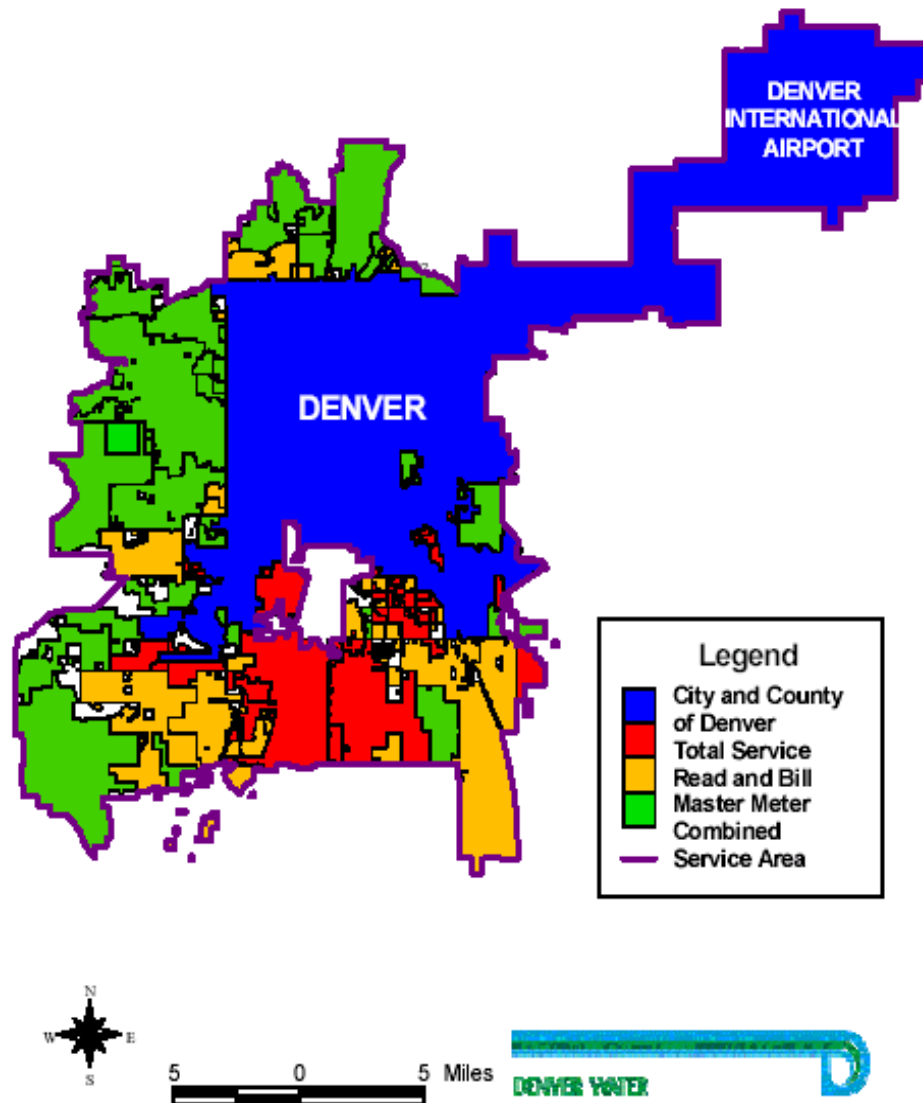


FIGURE 1. DENVER WATER COMBINED SERVICE AREA

- On 28 March 1997 (62 FR 14093), the Service issued a 12-month finding on the petitioned action along with a proposed rule to list Preble's as an endangered species and the announcement of a 90-day public comment period. The Service subsequently announced three public hearings regarding the proposed rule and extended the comment period on two occasions (62 FR 24387, 62 FR 67041).
- On 13 May 1998 (63 FR 26517), the Service announced the listing of Preble's as a threatened species pursuant to the Act.
- On 3 December 1998 (63 FR 66777), the Service announced a proposed special rule, the 4(d) rule, for Preble's that allowed certain activities, including rodent control, ongoing agriculture maintenance and replacement of existing landscaping, and existing uses of water anywhere within Preble's range, to be exempted from section 9 of the Act.² Subsequently, they published a final 4(d) rule in May 2001 (66 FR 28125), which was amended to include exemptions for certain noxious weed control and ditch maintenance activities in October 2002 (67 FR 61531). This amendment, and any exemptions under the 4(d) rule, is effective until 22 May 2004.
- On 17 July 2002 (67 FR 47154) the Service announced the proposed designation of critical habitat for Preble's; subsequently, on 21 November 2002, the Service announced they would extend the public comment period on proposed critical habitat for Preble's (67 FR 70202). On 28 January 2003, the Service announced the availability of the economic analysis and EA for the proposal to designate critical habitat for Preble's (68 FR 4160).

1.4.2 Baseline Preble's Meadow Jumping Mouse Habitat on Denver Water Properties

Denver Water has established definitions for what they consider to be potential and occupied Preble's habitat . These terms are defined in the HCP as follows:

- **Potential Habitat:** Areas on Denver Water properties that meet the criteria of Preble's habitat as determined by the Service guidance (USFWS 1999). Potential Preble's habitat generally has well developed riparian vegetation and relatively undisturbed grasslands, at elevations lower than 7,600 feet, and where trapping to date has not verified the presence or absence of Preble's.
- **Occupied Habitat:** Potential habitat with suitable vegetative conditions for Preble's habitat within one stream-mile of a positive trapping location of Preble's.

Table 1 presents the approximate total occupied and potential habitat acreage on individual Denver Water properties.

An environmental baseline characterizes the habitat on Denver Water properties in terms of availability. Therefore, this environmental baseline includes a discussion of the past and present impacts of all federal, state, and private actions and other human activities on Preble's in the planning area covered by the HCP; the anticipated impacts of all proposed federal activities in

² Under section 4(d) of the Act, a special rule can be tailored for a particular threatened species that has specific prohibitions (and exemptions) necessary and appropriate to conserve that species. In the case of Preble's, this special rule identified specific circumstances under which section 9 prohibitions would not apply.

TABLE 1. APPROXIMATE ACREAGE OF OCCUPIED AND POTENTIAL PREBLE’S HABITAT ON DENVER WATER PROPERTIES

Property	Occupied Habitat (acres)	Potential Habitat (acres)	Total Potential/Occupied Habitat (acres)
South Boulder Creek Properties (Below Gross Reservoir)	17	239	256
South Boulder Diversion Canal	17	7	24
Ralston Creek/Long Lake Feeder Ditch (above Ralston Reservoir)	13	0	13
Kassler and Waterton Canyon Properties	0	709	709
Foothills Water Treatment Plant Property	0	255	255
Conduit 26 Properties	0	384	384
Strontia Springs Reservoir	0	45	45
High Line Canal Near Plum Creek	49	0	49
Upper South Platte Lands	105	2,683	2,788
Cheesman Reservoir	0	1,620	1,620
Total	201	5,942	6,143

Source: DBWC 2003

the action area that have already undergone formal or early section 7 consultation; and the impact of state or private actions contemporaneous with the consultation in process.

Denver Water is currently involved in federal actions on its properties that are within Preble’s range in Colorado. For these activities, the effects to Preble’s, as well as other federally listed species, are authorized through prior section 7 consultations with the Service. These consultations have resulted in a biological opinion or letter of concurrence from the Service that authorizes these effects, given the agreed upon mitigation measures. These activities are discussed in detail in Section XII.A through Section XII.E of the HCP, and the citations for the biological opinions, which would discuss levels of acceptable take, are incorporated by reference. In summary these actions and the agencies involved include the following:

- Upper South Platte Watershed Restoration and Protection Project (U.S. Forest Service, Colorado State Forest Service, and Denver Water);
- Hayman Fire Response (U.S. Department of Agriculture – Natural Resources Conservation Service, U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers);
- Federal Energy Regulatory Commission License at Gross Reservoir (U.S. Forest Service, Bureau of Land Management, and Denver Water);
- Creation of Lehow Lake (Denver Water and Colorado Division of Wildlife); and
- Construction of a Water Reuse Plant (Denver Water).

1.4.3 Habitat Conservation Planning and NEPA Process

The habitat conservation planning process seeks to make compliance with the Act more efficient and effective, while providing voluntary opportunities for private landowners to be involved in habitat conservation (USFWS and NMFS 1996). Section 9 of the Act prohibits the take of any species listed as endangered or threatened. The Act was amended in 1982 under section 10(a)(1)(B), to allow for incidental take of endangered or threatened species by non-federal entities. The ITP process requires an applicant to submit an HCP that specifies impacts that are likely to result from covered activities and measures that would be taken to minimize and mitigate any impacts.

The result of such planning is an approved HCP that addresses Denver Water's municipal concerns, e.g., local land development interests and land-use activities listed under federal wildlife laws and mandates. Habitat Conservation Plans are also intended to reduce conflicts between listed species, in this case Preble's, and economic use or development activities by streamlining the issuance of ITPs. An ITP authorizes the incidental take of threatened or endangered species, but not the underlying activities that result in the take. Approval or regulation of such underlying activities falls under the jurisdiction of local, state, or other federal governmental agencies. The effects of authorized incidental take are minimized and mitigated to the maximum extent practical using the HCP and NEPA process, as required by the Act and the Service's Five-Point Policy. The Service's Five-Point Policy (65 FR 35242, June 1, 2000), or *Final Addendum to the Habitat Conservation Planning and Incidental Take Permitting Process*, provides additional guidance on biological goals and objectives, adaptive management, monitoring, ITP duration, and the public participation process.

Congress established a national policy for the environment through NEPA and the Council on Environmental Quality. The purposes of NEPA are:

- To declare a national policy which would encourage productive and enjoyable harmony between man and his environment;
- To promote efforts which would prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man;
- To enrich the understanding of the ecological systems and natural resources important to the nation; and
- To establish the Council on Environmental Quality (section 2, 42 *United States Code* (USC) § 4321).

NEPA requires all federal agencies to use an environmental evaluation process to analyze the effects of their proposed actions and to include other agency and citizen input. Denver Water is requesting that the Service issue an ITP. This is considered an action by a federal agency that requires review using the NEPA process to address the environmental effects associated with the action. Because development of the HCP is required as part of the ITP process, the effects of implementing the plan must be considered.

1.5 SCOPING

Scoping is the effort to involve agencies and citizens in determining the breadth of issues to be addressed in this EA. It identifies important issues and eliminates issues that are not appropriate; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related actions and associated documents; identifies permits, surveys, consultations, etc., as required by other agencies; and creates a schedule that allows adequate time for preparation and distribution of the EA for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise (e.g., the State Historic Preservation Office [SHPO] and American Indian tribes) to obtain early input. A copy of the EA has been forwarded to the SHPO and the appropriate American Indian tribes (identified on the map in Appendix A) were notified of its availability.

Denver Water has participated in various state and county HCP workgroups, involving local, state, and federal agencies, as well as representatives from the environmental and development community, in the planning process for the development of such plans. Please see Chapter 7.0, Consultation and Coordination, for a list of those agencies and individuals involved in workgroups with Denver Water and consulted in preparing the HCP. During January 2003, representatives from Denver Water met with the Service and environmental consultants to discuss and refine the alternatives, issues, impacts, and schedule for preparation of the EA, as well as to discuss the HCP.

A Notice of Availability for the EA and the locations where it would be made available was published in the *Federal Register*. The EA was also posted on the Denver Water and Service Web sites. Additionally, the Service maintains a mailing list of individuals and organizations that have requested review of HCP-related planning documents, and who received this EA.

1.6 ISSUES AND IMPACT TOPICS

1.6.1 Issues

Issues and concerns described in this EA were prepared from past planning efforts and input from Denver Water and the Service. The various permitting and consultation requirements that Denver Water is required to comply with were also considered (summarized in Section 1.6.2 of this EA). The issues identified were related to potential effects on Denver Water operations; wetland, riparian, and aquatic resources; floodplains (including upland floodplain plant communities); threatened, endangered, and species of special concern; and cultural resources.

1.6.2 Permit and Consultation Requirements

Activities conducted by Denver Water to operate and maintain its water system are subject to a variety of federal permitting processes that are subject to environmental review including, but not limited to:

- Special use permits issued by the U.S. Forest Service or Bureau of Land Management;
- Clean Water Act Section 404 permits issued by the U.S. Army Corps of Engineers; and
- Licenses issued by the Federal Energy Regulatory Committee.

Effects to federally listed species other than Preble's were not addressed in the HCP. However, it should be noted that if impacts to any of these species become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act. Should any other federally-listed species be subject to incidental take, consultation with the Service and appropriate permitting will be required.

1.6.3 Derivation of Impact Topics

Specific impact topics were analyzed in detail to focus the EA discussion and allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and executive orders; Denver Water and Service knowledge of special or vulnerable resources; and internal scoping. A brief rationale for the selection of each impact topic is given below, as is the rationale for dismissing specific impact topics from further consideration.

1.6.4 Impact Topics Selected for Detailed Analysis

Denver Water Operations

Denver Water's HCP was developed to protect suitable Preble's habitat, thereby supporting recovery of the species, while allowing Denver Water to conduct activities necessary to operate and maintain its water supply system. Therefore, the effects of the No-Action and Preferred Alternatives on Denver Water's continued function were selected as an impact topic.

Wetland, Riparian, and Aquatic Resources

Executive Order 11990 (*Protection of Wetlands*) requires an examination of impacts to wetlands, ensuring their protection. Many riparian areas are also considered wetlands, and they are included in this impact topic. Also, activities proposed by Denver Water may require temporary stream diversions, which could have an effect on aquatic resources. Therefore, wetlands, riparian, and aquatic resources were selected as an impact topic.

Floodplains

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains and the potential risk involved in placing facilities within floodplains. Therefore, floodplains was selected as an impact topic.

Threatened, Endangered, and Species of Special Concern

Issuance of the ITP is subject to section 7 consultation by the Service pursuant to the Act. This consultation is an analysis in which the Service considers the impacts of issuing the ITP on threatened or endangered species, including those not covered by the HCP. Therefore, the effects of the alternative actions on populations of threatened and endangered species were selected as an impact topic to be analyzed in detail in this EA. Impacts to species listed by the Colorado Division of Wildlife and/or the Colorado Natural Heritage Program as endangered, threatened, or special concern species are also considered.

Cultural Resources

The National Historic Preservation Act, as amended in 1992 (16 USC 470 *et. seq.*) and NEPA require the consideration of impacts on cultural resources either listed in or eligible to be listed in the National Register of Historic Places (NRHP). The process and documentation required for completion of this EA would be used to comply with section 106 of National Historic Preservation Act, in accordance with section 800.8(3)(c) of the Advisory Council on Historic Preservation's regulations (36 CFR Part 800). Effects to NRHP-eligible or listed cultural resources could result from implementation of either the No-Action or the Preferred Alternative; therefore, this impact topic will be analyzed in detail.

1.6.5 Impact Topics Dismissed from Detailed Analysis

Geology and Soils

Although the alternatives would result in ground-disturbing activities that could have impacts on soils, disturbances would be generally limited to narrow corridors and small areas, and would be confined to previously disturbed areas, to the greatest extent practicable. Mitigation would require measures to prevent erosion, including revegetation activities, that would ensure most impacts remain temporary. Overall, impacts on soils would be negligible. There would be no impacts on the geology of the Denver Water properties. No specific geologic hazards such as earthquakes, volcanoes, or landslides are known to occur in the planning area covered by the HCP. Therefore, geology and soils were dismissed from further analysis.

Water Resources

The 1972 Federal Water Pollution Control Act (33 USC § 1251 et. seq.) as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. Although activities proposed by Denver Water would involve actions in waterways, appropriate measures would be taken, as required by state and federal law, to eliminate or offset any impacts to surface or ground water. Impacts on the biological component of water resources, aquatic habitat, are being assessed under wetland, riparian, and aquatic resources. In addition, impacts to water resources would also be considered during consultation with federal agencies identified in Section 1.6.2 of this EA.

Issuance of the ITP does not facilitate the use of Denver Water's existing perfected water rights through the use of Denver Water's water supply system. Activities identified in the HCP, and covered by the ITP, would be conducted outside of Preble's habitat if no ITP were issued, or other means would be utilized to supply water to Denver Water's customers without causing take. Therefore, issuance of the permit is unrelated to and independent of Denver Water's system, operations and maintenance thereof, and use of its existing and perfected water rights. Given these considerations, water resources were dismissed from detailed analysis.

General Wildlife

The activities that would occur under either alternative are not anticipated to impact wildlife species other than those that have limited distributions and/or rare or sensitive habitat requirements and are, therefore, listed as threatened, endangered, proposed, candidate, or special concern species by Service, Colorado Division of Wildlife, and/or the Colorado Natural Heritage Program. The state listed species are addressed in detail. Therefore, wildlife, in general, was dismissed as an impact topic.

Federally Listed Species of the Central Platte River Ecosystem

In 1994, the Department of the Interior entered into a Memorandum of Agreement with the states of Colorado, Nebraska, and Wyoming, to address the needs of four federally listed species in the central Platte River ecosystem: the interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus circumcencetus*), whooping crane (*Grus americana*), and the pallid sturgeon (*Scaphirhynchus albus*). Any federal action that facilitates the continuation of existing water depletions, or causes new water depletions, in the Platte River have been determined by the Service to jeopardize these species. Granting of ITPs under either alternative would not facilitate existing or new depletions, therefore there would be no effect to these species and they were dismissed from detailed analysis.

Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 *et seq.*) requires land managers to protect air quality. Implementation of the proposed action would temporarily affect local air quality through increased dust and vehicle emissions from the operation of construction and maintenance equipment. Hydrocarbon, nitrous oxide, and sulfur dioxide emissions would be rapidly dispersed by the prevalent winds in the planning area. Dust raised by construction/maintenance equipment would increase airborne particulates intermittently, but this phenomenon is not expected to be appreciable.

Overall, impacts to air quality from dust and construction/maintenance equipment emissions would be negligible and temporary. Effects would occur only during construction and/or maintenance; no long-term effects would be expected. Therefore, air quality was dismissed from detailed analysis.

Noise

Implementation of the proposed action would temporarily affect local sources of noise from the operation of construction and maintenance equipment. Overall, impacts to the ambient noise environment (i.e., the noise environment that exists naturally), from the operation of construction/maintenance equipment would be negligible and temporary. Effects would occur only during construction or maintenance; no long-term effects would be expected. Therefore, noise was dismissed from detailed analysis.

Prime and Unique Farmlands

In August 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture, Natural Resources Conservation Service as prime or unique. Prime farmland is defined as soil which particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are no prime or unique farmlands associated with the planning area covered by the HCP that could be affected. Therefore, prime and unique farmlands were dismissed from detailed analysis.

Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas

No areas on Denver Water properties within the HCP boundaries have been designated as ecologically critical. In 1984, the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands determined that the South Platte River from below Elevenmile Dam to the high water line of Cheesman Reservoir was eligible for Wild and Scenic Rivers designation. In 1996, the South Platte River, from the stream gage below Cheesman Dam to the high water line of Strontia Springs Reservoir, and the North Fork, of the South Platte River from the Berger property, near Insmont, downstream to a point ¼ mile from its confluence with the South Platte River, were also determined to be eligible for potential addition to the Wild

and Scencie Rivers System (U.S. Forest Service 2000). This designation was proposed considering existing water uses, including Denver Water's activities on its properties within these segments of the South Platte River. Therefore, the alternatives would have no effect on the decision and this topic was dismissed from detailed analysis.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to American Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal American Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources on the Denver Water properties covered by the HCP. Therefore, American Indian trust resources were dismissed as an impact topic.

Ethnographic Resources

There are no known ethnographic resources in the planning area covered by the HCP. Should ethnographic resources be identified as a concern during consultation with appropriate American Indian tribes (see map in Appendix A), mitigation measures will be agreed upon with those tribes. The location of ethnographic resources will not be made public under any circumstance. Because no ethnographic resources are known to occur within the planning area, this topic will not be addressed further in the EA.

Socioeconomic Environment

Neither the No-Action nor the Preferred Alternative would change local or regional land use or transportation, or appreciably affect local businesses or agencies. Therefore, the socioeconomic environment was dismissed as an impact topic.

Environmental Justice

Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. Neither alternative would have health or environmental effects on minorities or low-income populations or communities as defined in the U.S. Environmental Protection Agency *Draft Environmental Justice Guidance* (EPA 1996). Environmental justice was, therefore, dismissed from detailed analysis.

2.0 ALTERNATIVES

2.1 INTRODUCTION

This section describes the No-Action and Preferred Alternatives for implementing the *Preble's Meadow Jumping Mouse Habitat Conservation Plan* prepared by Denver Water. The Preferred Alternative was prepared using the information presented in the HCP, and incorporates by reference the detailed discussions and support information.

Under either alternative, Denver Water would seek to conduct the activities necessary to operate and maintain its water system. These activities include:

Activities with Insignificant Levels of Take

1. Rodent control within 10 feet of or inside of any structure³
2. Ongoing agricultural activities (does not apply to new agricultural practices that increase impacts to, or further encroach upon, Preble's habitat)³
3. Maintenance and replacement of existing landscaping and related structures and improvements³
4. Irrigation and associated activities, including operation and maintenance of irrigation facilities, pumping, maintenance and operation of diversions and headgate structures
5. Fence maintenance
6. Scientific measuring device repair, rehabilitation, replacement and maintenance. This includes, but is not limited to, stream gaging stations and water quality monitoring stations
7. Bridge crossing rehabilitation, repair and maintenance within the existing footprint with no associated negative impacts
8. Dam maintenance within the existing footprint
9. Existing uses of water associated with the exercise of perfected water rights pursuant to state law and interstate compacts and decrees³
10. Existing manmade changes in hydrology, including without limitation, runoff from urban development, storm control, discharges from conduits for maintenance or emergency, diversion facilities and dams
11. Domestic pet predation from existing development
12. Maintenance of existing features listed in paragraph IV.B of the HCP
13. Weed control³
14. Ditch Maintenance (except at the South Boulder Canal and the High Line Canal, which are addressed separately in this HCP): Preble's meadow jumping mice may be taken incidental to normal and customary ditch maintenance activities, as described in the HCP (Denver Water 2003)³

³ These activities are defined and exempted under the 4(d) rule, which has a sunset date of 22 May 2004.

Operations and Maintenance

1. New residential, commercial, institutional, and industrial structures and facilities (includes water treatment plants)
2. New road and bridge construction or replacement
3. New recreational trail development
4. New recreational development (other than trails but including related structures and landscaping)
5. Stream channel/riparian area alteration
6. New ditch construction
7. Existing utilities replacement and construction of new utility lines
8. Channel improvements
9. Construction of temporary access roads
10. Vegetation management
11. Construction of temporary stream diversions
12. Temporary dewatering of construction sites
13. Construction of new scientific measuring devices
14. Hydropower installation
15. Fire hydrant construction and replacement
16. Siphon construction and replacement
17. Culvert construction and replacement
18. Diversion structure construction and replacement
19. Canal efficiency improvements
20. Other activities necessary to maintain and operate Denver Water's existing system

Activities on Denver Water Easements

1. Channel improvements to prevent damage to the servient estates (i.e., properties on which a Denver Water easement occurs) in association with delivery of water supplies
2. Improvements to the diversion structures owned and operated by others to allow for compatibility with Denver Water's operations
3. Repairs to property damage
4. Any operations and maintenance as described above

Foreseeable Activities

1. Conversion of the South Boulder Canal and siphons at Coal Creek and Doudy Draw to a buried pipeline
2. Conversion of the Long Lake Feeder Ditch to a buried pipeline
3. Conduit W Construction from Foothills through Kassler: Conduit W would be a major conduit from Foothills Treatment Plant that would serve Denver Water's customers and provide operational flexibility. Conduit W would parallel Conduits 133 and 20, and would be phased in over the next 20 years
4. Construction of new sewer line across Little Willow Creek
5. Construction of a new treated water distribution line parallel to Conduit 27
6. High Line Canal System Refinements

Adaptive Management

1. Ditch maintenance related to the High Line Canal
2. Sediment removal at Strontia Springs Reservoir
3. Expansion of the Foothills Treatment Plant

2.2 ALTERNATIVE A: NO ACTION

Under the No-Action Alternative, the Service would evaluate individual ITPs and HCPs prepared by Denver Water on a project-by-project basis. Activities that avoided incidental take of Preble's or its habitat would be approved, while each proposed activity on Denver Water property that may result in incidental take would require an individual ITP and HCP pursuant to section 10(a)(1)(B) of the Act. If a federal action (e.g., construction of a proposed road or interchange using federal funds) on Denver Water property may affect Preble's or its habitat, incidental take could be allowed through the consultation process outlined in section 7 of the Act, and through the preparation of an incidental take statement (if it was determined that the proposed action would not jeopardize the continued existence of Preble's) that includes the amount or extent of anticipated take due to the federal action, reasonable and prudent measures to minimize the take, and terms and conditions that must be observed when implementing those measures (USFWS and NMFS 1996, Denver Water 2003).

2.2.1 Covered Activities

Under the No-Action Alternative, each proposed activity that could result in the incidental take of Preble's would be covered in an individual ITP and HCP for that activity. As listed in Section 2.1, these activities would include those with insignificant levels of take (with the exception of numbers 1, 2, 3, 9, and 13 from the list in Section 2.1, which are exempted under the 4(d) rule), operations and maintenance activities, foreseeable activities, and the adaptive management. Development of an HCP for issuance of an individual ITP to cover each of these activities would require anywhere from six to nine months for each permit requiring an EA, and less time for those that do not.

2.2.2 Take

The number of individual Preble's subject to incidental take (e.g., through capture, injury, or mortality) cannot be estimated because the amount of occupied habitat on Denver Water property is presently unknown. In accordance with guidance presented in the Service's Five-Point Policy, destruction of occupied or potential habitat or modification resulting from the proposed activities would be the basis of take for the purpose of the ITPs related to Preble's and requested by Denver Water.

Both temporary and permanent take are anticipated from implementation of the No-Action Alternative. Denver Water activities are anticipated to result in less than one acre of permanent take, and less than 74 acres of temporary take, but may result in up to 10 acres of permanent

take (Denver Water 2003). Under this alternative, activities that disturb greater than 25 acres of potential or occupied Preble's habitat at any one time could be permitted. Table 2 summarizes the location and amount of permanent and temporary take anticipated Denver Water properties within the range of Preble's habitat.

TABLE 2. APPROXIMATE ACREAGE OF PERMANENT AND TEMPORARY TAKE FOR ACTIVITIES ON DENVER WATER BOARD PROPERTIES

Property	Forseeable Covered Activities & Potential Adaptive Management Activities	Temporary Habitat loss (acres/yr)	Forseeable Permanent Habitat Loss (acres) ³
South Boulder Canal Stream crossings at Coal Creek and Doudy Draw	Replace siphons with below grade pipe	10	< 1
Ralston Creek above Reservoir	Convert Long Lake Feeder Ditch to below grade pipe	0.1	0
Kassler	Recovery of Waterton Canyon fish flows project; Conduit W construction	3	< 1
Foothills ¹	Sewage line construction across Little Willow Creek; Treated water conduit construction; <i>Treatment plant expansion</i>	6.5	0
Strontia Springs Reservoir ²	<i>Sediment Removal</i>	25	0
High Line Canal near Plum Creek	High Line Canal Efficiency Improvements, Siphon Replacement, Conduit Construction	2	0
Rangewide	Operations and maintenance	~ 27	0
Total		~ 74	< 1

Source: Denver Water 2003

¹ The project in italics could be part of an adaptive management program and its effects are currently unknown. Therefore the acreage of take calculated includes an estimate of the potential impacts associated with treatment plant expansion.

² The sediment removal project is part of a future adaptive management program and the impacts are only an estimate at this time.

³ This alternative could result in up to 10 acres of permanent take, however, less than one acre is anticipated.

2.2.3 Avoidance, Minimization, and Mitigation

Specific avoidance and minimization efforts, Best Management Practices, and mitigation measures would have to be identified on a project-by-project basis to eliminate or offset the take of Preble's habitat under this alternative.

2.3 ALTERNATIVE B: PREFERRED ALTERNATIVE

Under the Preferred Alternative, Denver Water would implement an HCP for Preble's on properties with occupied and potential habitat. This area totals approximately 6,143 acres in Boulder, Jefferson, and Douglas Counties, divided into a Northern and Southern Permit Boundary (**Figures 2 and 3**). The HCP would be implemented as part of the provisions for

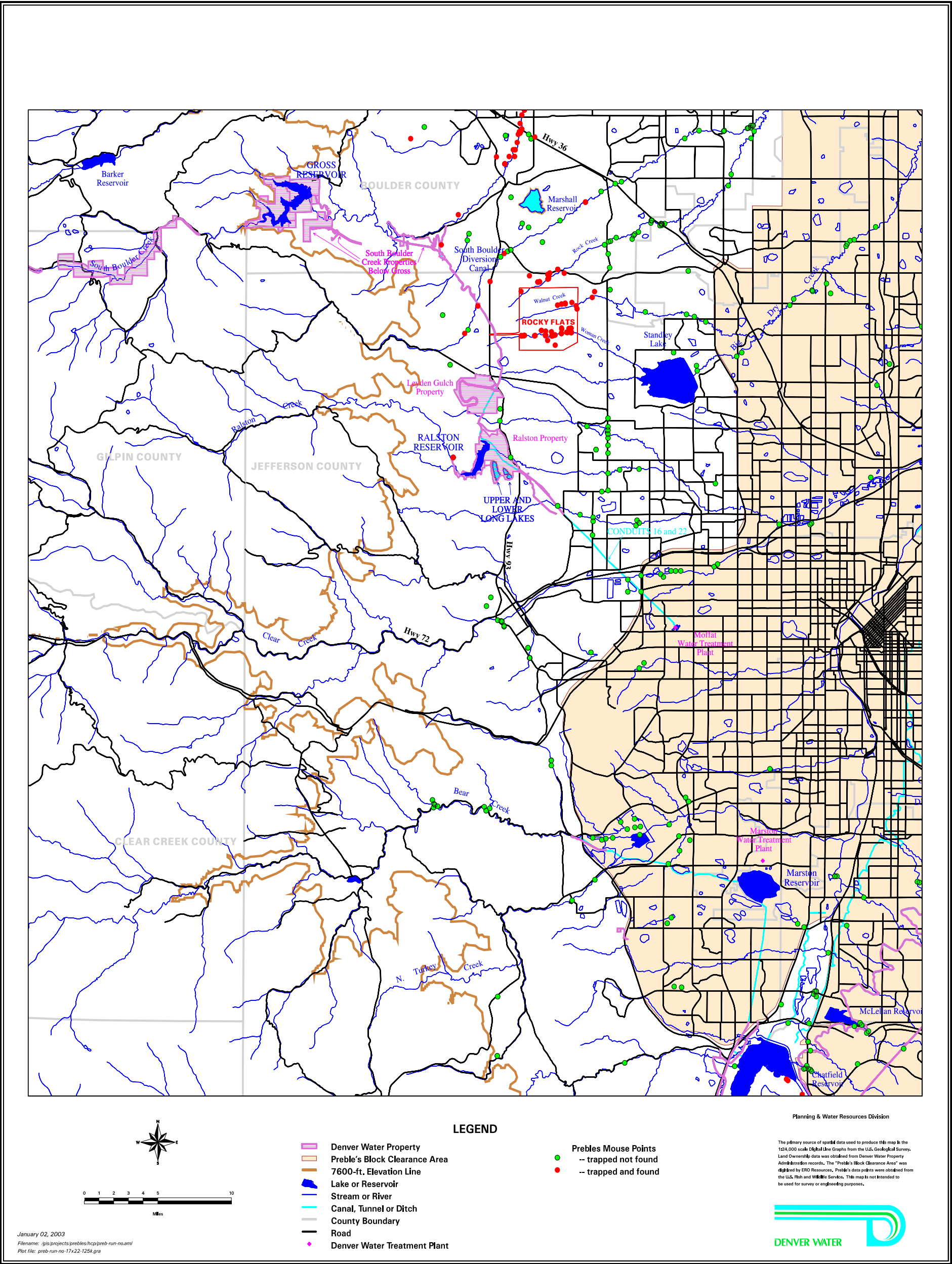


FIGURE 2. NORTHERN PERMIT BOUNDARY FOR DENVER WATER’S HABITAT CONSERVATION PLAN

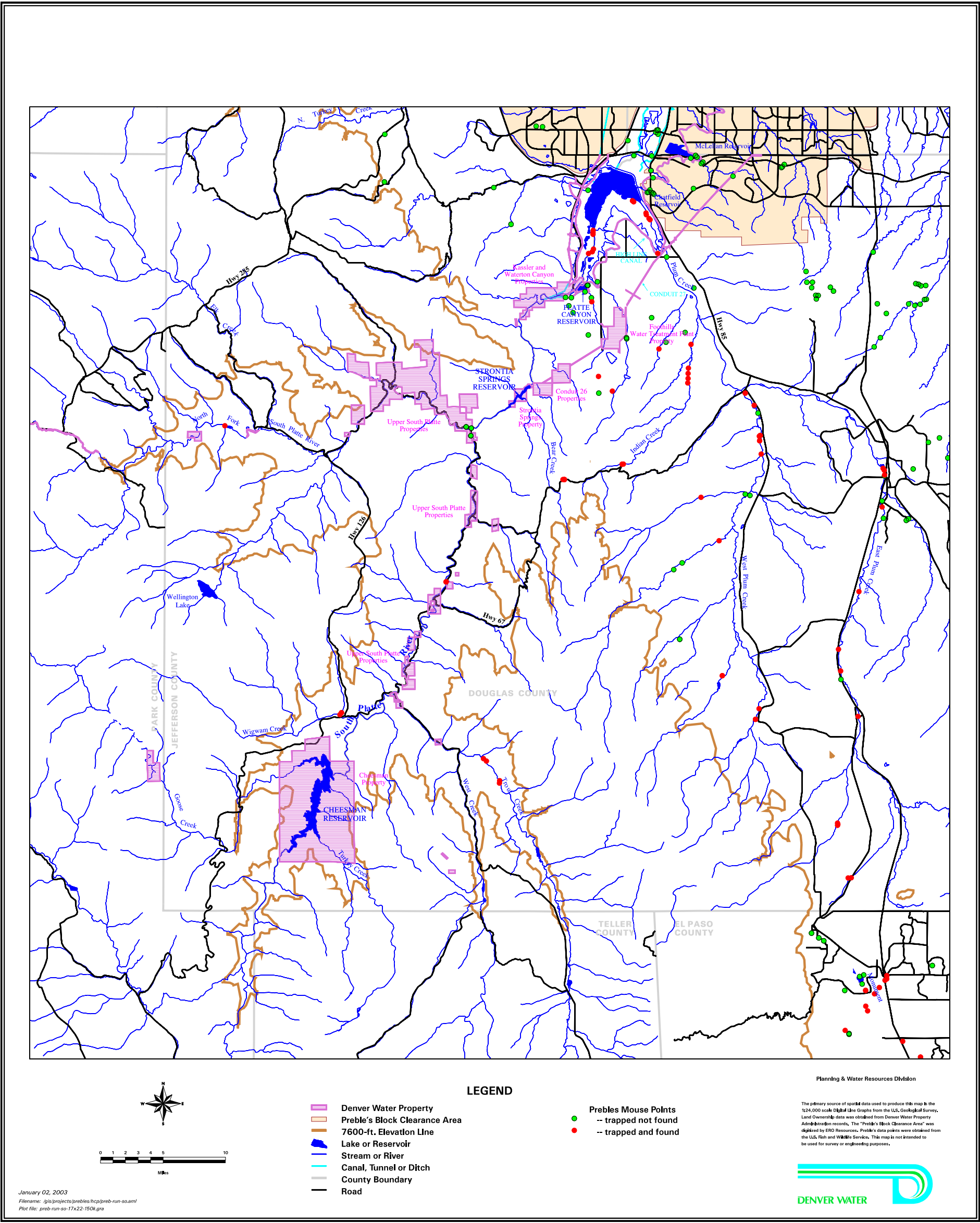


FIGURE 3. SOUTHERN PERMIT BOUNDARY FOR DENVER WATER’S HABITAT CONSERVATION PLAN

obtaining an ITP for Denver Water activities extending from an upper elevation of 7,600 feet (the upper limit of Preble's habitat in Colorado) in mountainous terrain, through lands in the Colorado piedmont at mid-elevations, to lower elevations on the plains near Denver.

The management activities in the HCP would be applicable for the duration of the ITP (30 years), with the possibility of full renewal or shorter extensions upon the mutual agreement of Denver Water and the Service (Denver Water 2003). The HCP would become effective upon issuance of the ITP from the Service. The management activities are discussed in detail in the HCP and are summarized here, as appropriate.

2.3.1 Habitat Identification and Zone Descriptions

Denver Water evaluated their properties below the 7,600-foot elevation to identify occupied, potential, and unsuitable Preble's habitat by first creating a Geographic Information System database, incorporating information such as the Colorado Division of Wildlife potential Preble's habitat mapping, the Boulder and Jefferson County 100-year floodplain mapping developed by the Federal Emergency Management Agency, and U.S. Geological Survey hydrography data. Based on field observations of habitat suitability, and trapping surveys, this database was refined to identify areas as occupied, potential, or unsuitable. The properties were divided into different Conservation Zones (see the HCP and Chapter 6.0, Glossary, of this EA for a definition of Conservation Zones) that would be managed for the conservation of existing potential and occupied habitat. In total, Denver Water properties contain approximately 201 acres of occupied habitat and 5,942 acres of potential habitat (Denver Water 2003).

The areas identified by Denver Water include the North Conservation Zone (**Figure 4**), the South Conservation Zone (**Figure 5**), the High Line Canal Conservation Zone (**Figure 6**), and the Upper South Platte Properties (**Figure 7**). The overall management strategy identified in the Conservation Zones focuses on two goals: (1) prevention of disturbance to occupied and potential habitat through avoidance, minimization, and utilization of Best Management Practices when practicable, recognizing, however, that impacts in the conservation zones would occur; and (2) offsetting impacts to occupied and potential habitat by implementing Best Management Practices and mitigation measures.

Ultimately, the management strategies would differ between zones (as identified in the HCP) based on factors such as: (1) the types of operations and facilities on the property; (2) the biological significance of mitigation at a site; and (3) the need for flexibility to conduct Denver Water activities (Denver Water 2003).

2.3.2 Covered Activities

Under the Preferred Alternative, the single HCP and ITP would cover the activities with insignificant levels of take, including those otherwise exempted under the 4(d) rule, operations and maintenance, foreseeable activities, and adaptive management, as described in Section 2.1. These covered activities are described in detail in the HCP (Denver Water 2003). Issuance of the single ITP to cover all of these activities would likely take three to six months.

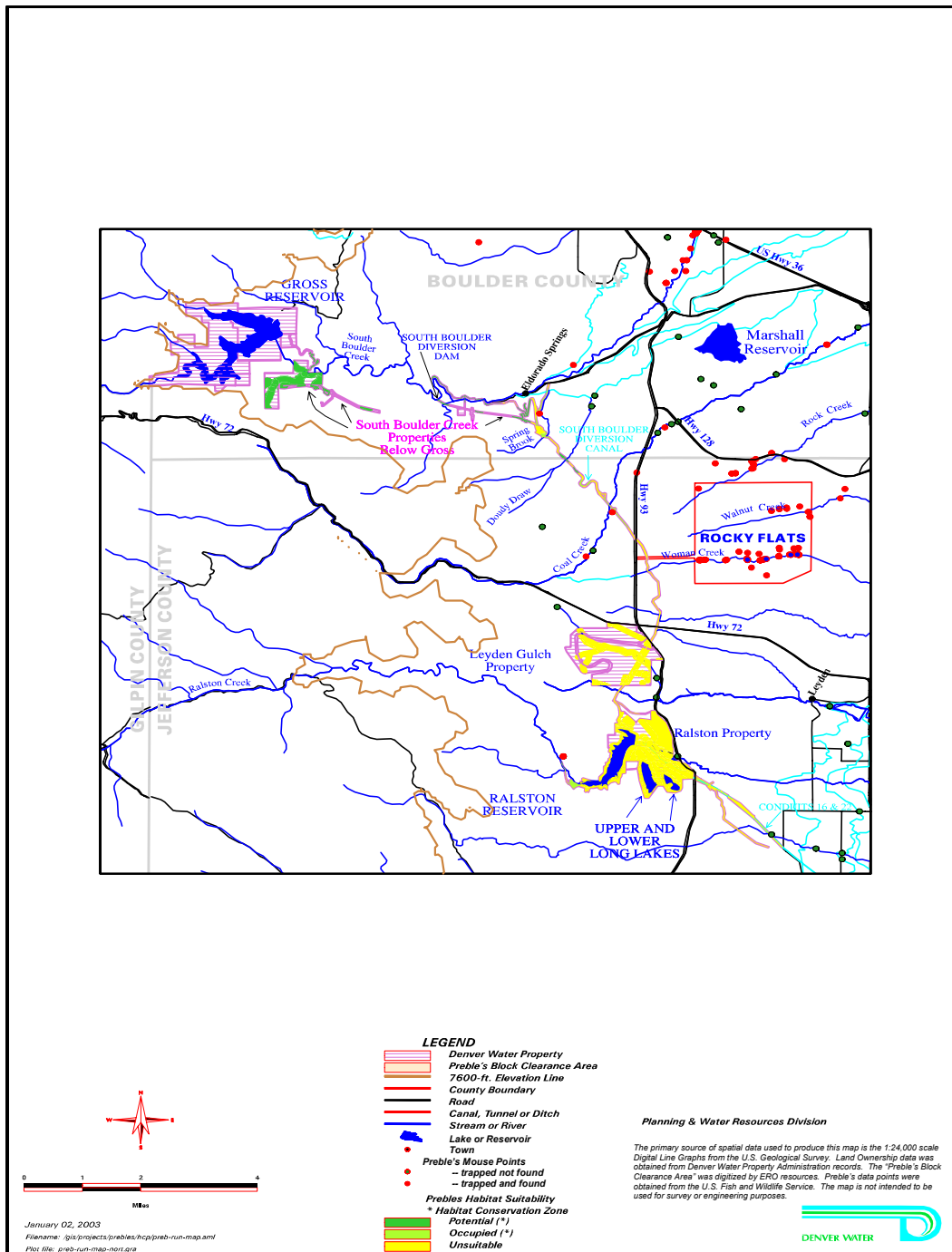


FIGURE 4. NORTH CONSERVATION ZONE IDENTIFIED IN DENVER WATER'S HABITAT CONSERVATION PLAN

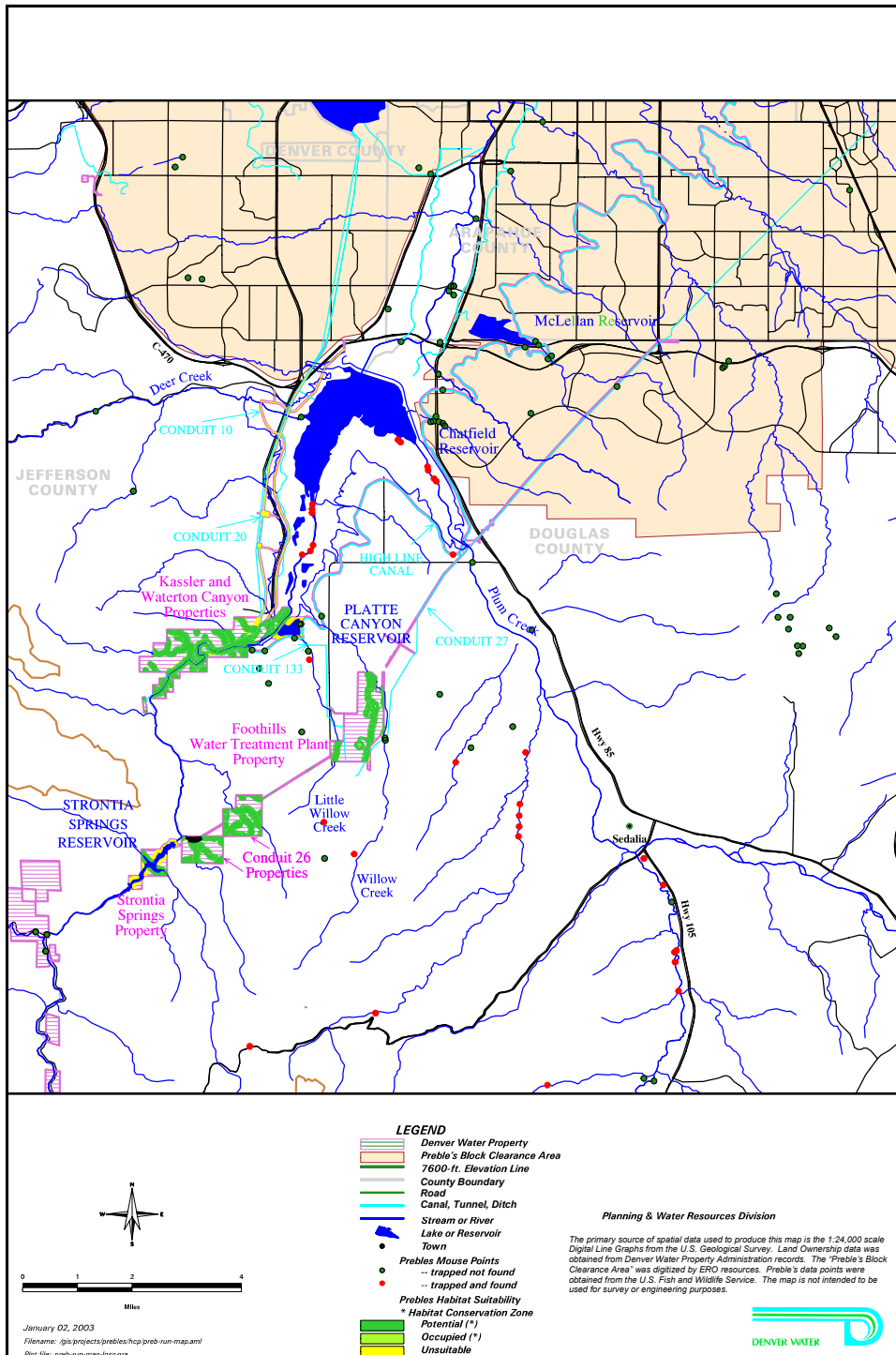


FIGURE 5. SOUTH CONSERVATION ZONE IDENTIFIED IN DENVER WATER'S CONSERVATION PLAN

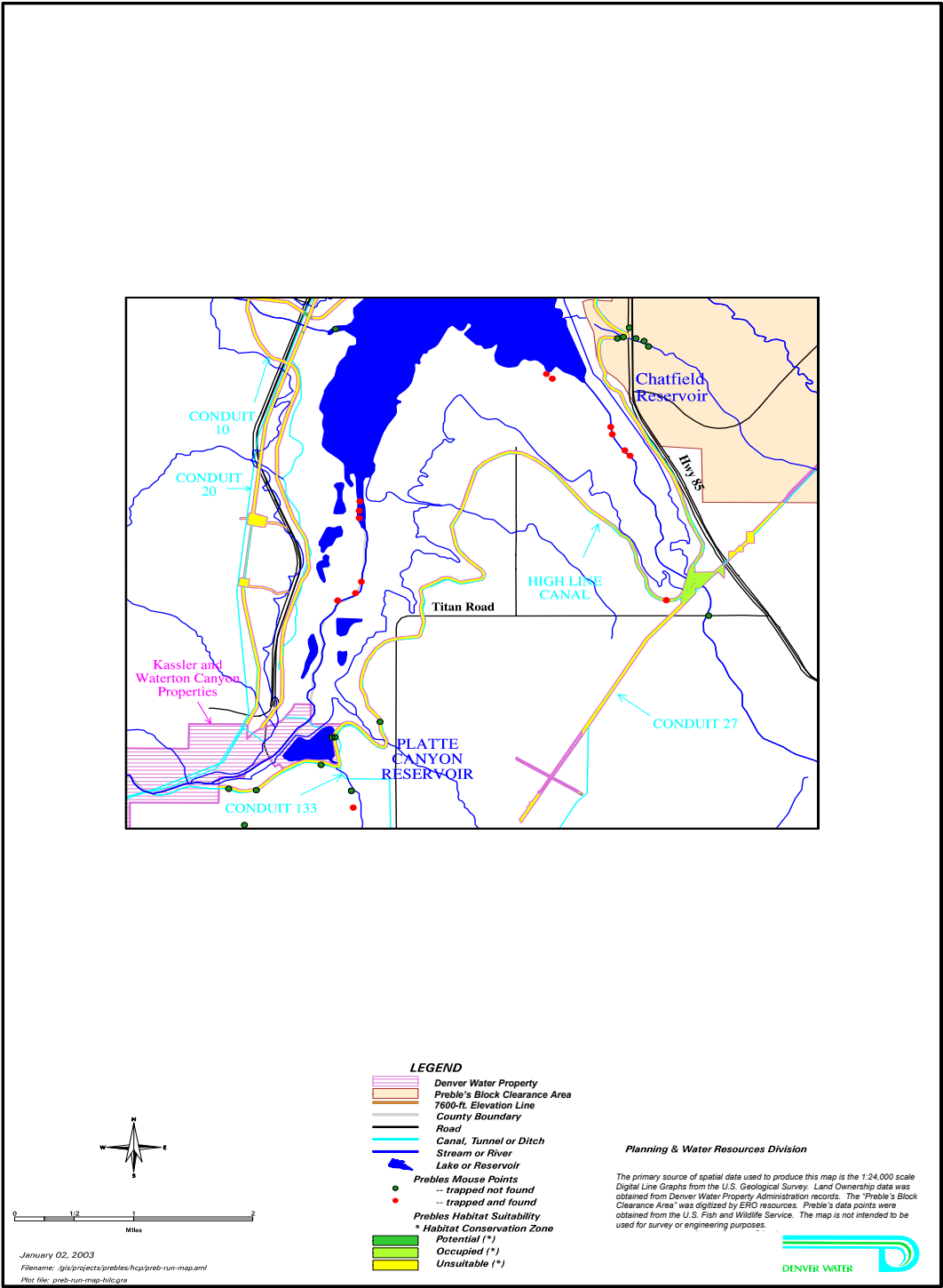


FIGURE 6. HIGH LINE CANAL CONSERVATION ZONE IDENTIFIED IN DENVER WATER'S CONSERVATION PLAN

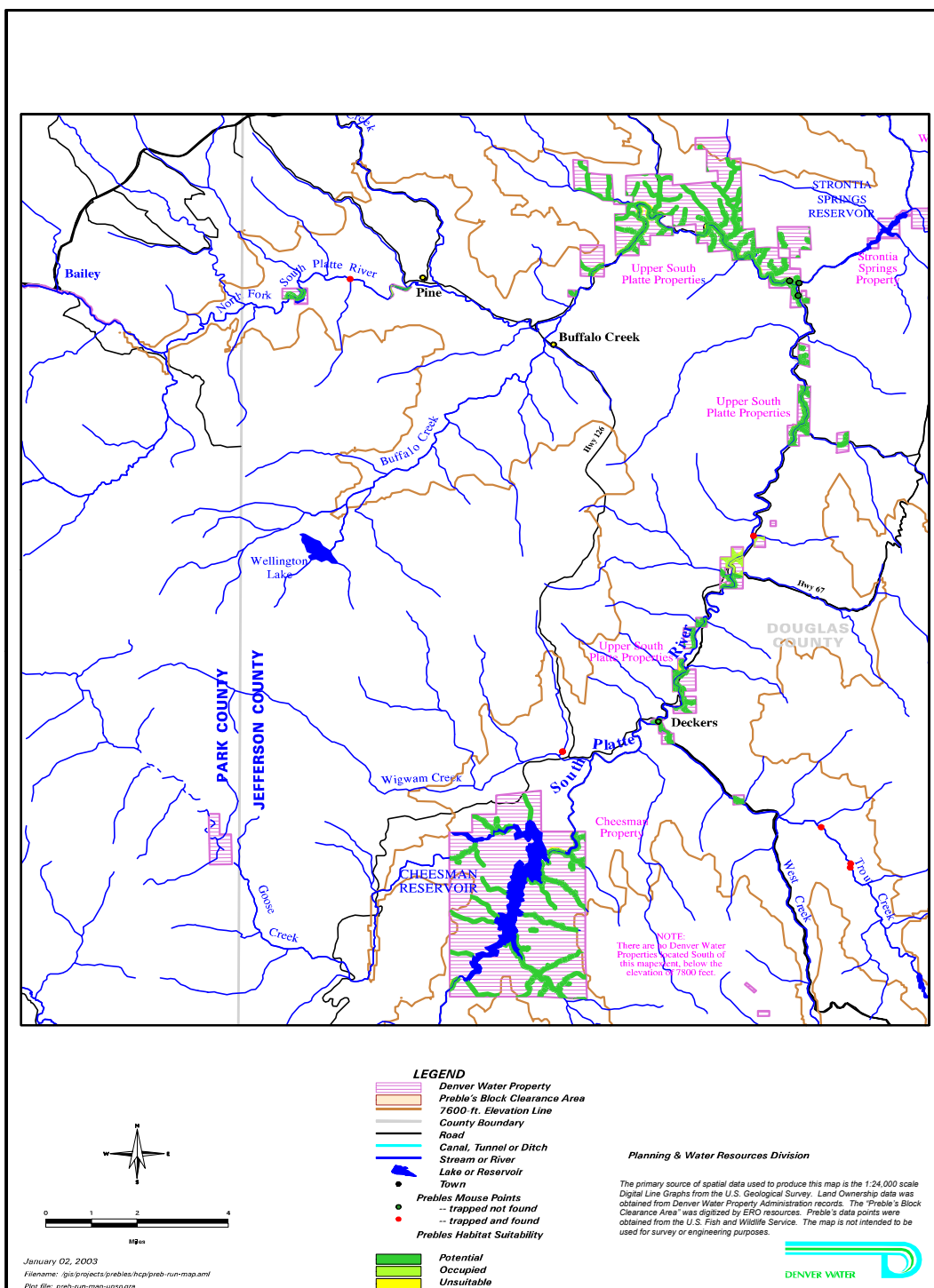


FIGURE 7. UPPER SOUTH PLATTE PROPERTIES IDENTIFIED IN DENVER WATER'S CONSERVATION PLAN

2.3.3 Take

The number of individual Preble's subject to incidental take (e.g., through capture, injury, or mortality) cannot be estimated because the amount of occupied habitat on Denver Water property is presently unknown. In accordance with guidance presented in the Service's Five-Point Policy, destruction of occupied or potential habitat or modification resulting from the covered activities would be the basis of take for the purpose of the HCP and single ITP under the Preferred Alternative (Denver Water 2003).

Both temporary and permanent take are anticipated from implementation of the Preferred Alternative. The HCP states that, for the duration of the ITP (30 years), Denver Water may take a total of 75 acres of Preble's habitat, of which up to 10 acres may be permanent. Denver Water anticipates that the covered activities under this alternative, as identified in the HCP, would result in less than one acre of permanent take and less than 74 acres of temporary take, which is considered the best case scenario. However, in the worst case scenario, the permit would allow for 10 acres of permanent take should it be necessary for Denver Water to conduct the covered activities, and only 65 acres of temporary take. Under either scenario, no more than 25 acres of temporary take would be permitted at one time (Denver Water 2003). Table 2 summarized the location and amount of permanent and temporary take anticipated on Denver Water properties within the boundary of the HCP.

2.3.4 Avoidance, Minimization, and Mitigation Described in the Habitat Conservation Plan

The HCP identifies efforts, Best Management Practices, and specific mitigation measures to offset take. The avoidance and minimization efforts and mitigation are described in detail below, while the Best Management Practices can be found in Appendix 5 of the HCP. These Best Management Practices establish a system-wide management approach that would be applied to any covered activities involving potential impacts to Preble's habitat. Denver Water employees responsible for operating and maintaining the water supply system would be informed of the avoidance, minimization, and mitigation measures they should take to offset or eliminate impacts to Preble's.

General Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation measures were analyzed by Denver Water as part of HCP preparation. Before conducting a covered activity on occupied and/or potential habitat, Denver Water would determine whether avoidance and minimization efforts are applicable, practicable, and can be used to avoid, reduce, or eliminate take. Efforts related to avoidance and minimization could include the following:

- Not engaging in the activity (avoidance)
- Conducting the activity in a different location outside of occupied or potential Preble's habitat (avoidance)

- Conducting the activity during the Preble's inactive season (avoidance)
- Decreasing the area of the activity (minimization)
- Decreasing the duration of the activity (minimization)

The use of Best Management Practices would represent the most practicable avoidance or minimization effort for the Denver Water system. Appendix 5 of the HCP lists Best Management Practices that are applicable to Denver Water's routine operations, maintenance, and other activities in Preble's habitat. In some cases, the use of Best Management Practices alone would avoid take, and neither mitigation nor monitoring would be necessary. In other situations, Best Management Practices would minimize take, however, where take still occurs, mitigation measures have been identified that would offset those effects (Denver Water 2003). Generally, mitigation includes:

- Restoration of all temporary impacts will immediately follow project completion.
- Temporarily disturbed habitat areas will be revegetated by the end of the first full growing season following the disturbance action.
- Monitor restoration beginning in the year following restoration activities up to five years after mitigation was conducted, or until success is achieved.
- Success is achieved when shrub/tree vegetation (riparian and upland) cover is equal to or greater than 70% of the amount of cover that existed prior to disturbance, as measured by the line transect method, or a shrub-for-shrub or tree-for-tree replacement on small sites.
- Success is achieved when upland graminoid/forb vegetation (riparian and upland) cover is equal to or greater than 70% of the amount of cover that existed prior to disturbance, as measured by the line transect method.
- State listed noxious weeds will be controlled to prevent competition with planted vegetation. Noxious weeds will not exceed 5% canopy cover in revegetated areas.

Mitigation to Offset Temporary Take

During the term of the HCP, no more than 25 acres of temporary impact would occur at any one time and not more than 74 acres would be temporarily affected over the life of the ITP. To offset this impact, Denver Water would restore temporarily disturbed vegetation in occupied and potential habitat according to the following conditions:

- Impact areas and successful restoration would be tracked in a project database;
- Once an impact area is successfully restored according to the Success Criteria (Denver Water 2003), that area would be deducted from the total impact area;
- The total impact area would not exceed 25 acres at any one time; and
- If impacts are anticipated to exceed 25 acres at any one time, Denver Water would consult with the Service to determine appropriate mitigation to offset additional impacts. Measures may include enhancements or preservation on properties containing occupied or potential habitat (Denver Water 2003).

Mitigation to Offset Permanent Take

Denver Water estimates that approximately one acre of permanent impact is likely to occur from the foreseeable and planned activities during the term of the ITP. To offset the foreseeable 1-acre impact, Denver Water would:

- Create up to 0.25 acre of riparian shrub and 2 acres of upland habitat at Lehow Lake;
- Revegetate social trails and dirt roads at Kassler that are no longer in use; and
- Create up to 0.25 acre of upland potential habitat at Long Lake Feeder Ditch.

It should be noted that the ITP and HCP would allow up to a maximum of 10 acres of permanent impacts. In the event that permanent take exceeds the estimated one acre, the additional impacts would be offset by dedicating a conservation easement at a preservation ratio of 8:1 (i.e., if one additional acre of take occurs, Denver Water would dedicate 8 acres of an easement for Preble's or its habitat), by enhancements at a ratio of 2:1, or a combination of preservation (6:1) and enhancements (1:1), as defined by the HCP (Denver Water 2003).

2.3.5 Monitoring and Reporting

Section 10 of the Act requires that the HCP include monitoring and reporting measures to determine whether the terms and conditions of the plan are being met. Denver Water would perform compliance and effectiveness monitoring to implement these regulations. *Compliance monitoring* is primarily the responsibility of the Service but Denver Water will provide the Service with the information needed for compliance monitoring in an annual report. The primary objective of compliance monitoring is to assure that the terms of the HCP are being met, and that authorized levels of take are not exceeded (Denver Water 2003).

Effectiveness monitoring determines if the anticipated impacts and amount of take from the covered activities are occurring, and if progress is being made toward the biological goals and objectives of the HCP. This monitoring would occur on an HCP-wide level, while specific goals have been identified for the North, South, and High Line Canal Conservation Zones, as discussed in the HCP (Denver Water 2003).

2.4 ALTERNATIVES CONSIDERED BUT DISMISSED

2.4.1 Participation in County Habitat Conservation Plans

Under this alternative, Denver Water considered participating in county-wide HCPs still under preparation for Boulder, Douglas, and Jefferson Counties. In order to participate, Denver Water would have three separate Implementation Agreements, thereby being subjected to county review and approval mechanisms that currently do not exist. Each HCP would be tailored to specific conservation and incidental take goals and objectives that may or may not completely meet the needs of Denver Water. Best Management Practices, monitoring requirements, and

mitigation requirements would vary depending upon which HCP applied to the particular Denver Water property and activity. Denver Water would also have to continue with the No Action Alternative until each of the county HCPs was finalized. Because this alternative does not ensure that Denver Water's purpose and need for an HCP are satisfied, considering the difficulties of managing their properties for standards that vary by county, and considering additional funds would have to be spent developing the necessary agreements, it was dismissed from further consideration.

2.4.2 Participation in a Single Statewide Habitat Conservation Plan and Incidental Take Permit

This alternative would require preparation of a single HCP for the seven Colorado counties within Preble's range in Colorado, and a single ITP related to that HCP. Individual public and private landowners, including county, town, and city governments, would participate in the HCP through voluntary management programs; Implementing Agreements; certificates of inclusion in the single ITP; sale or donation of lands to a public or private conservation organization; participation in state or federal incentive programs for land conservation; partnerships with other participants in the HCP effort; agreement to the terms of the HCP and the ITP; exemption from regulation based on the terms of the HCP or permit; or other methods. Implementation of the terms of the HCP might require an intergovernmental agreement with each local government whose boundaries include a participating landowner. Denver Water would also have to continue with the No-Action Alternative until the state-wide HCP was finalized. Because this alternative does not ensure that Denver Water's purpose and need for an HCP are satisfied, and additional funds would have to be spent developing the necessary agreements, it was dismissed from further consideration.

2.5 COMPARATIVE SUMMARY OF THE NO-ACTION AND PREFERRED ALTERNATIVES

TABLE 3. COMPARATIVE SUMMARY OF ALTERNATIVES

ACTIVITY	ALTERNATIVE A (NO ACTION; PROJECT-BY-PROJECT)	ALTERNATIVE B (PREFERRED ALTERNATIVE)
Permitting	Multiple Incidental Take Permits, pursuant to the Endangered Species Act of 1973, as amended, that allow take of Preble's or its habitat on a project-by-project basis.	A single Incidental Take Permit, pursuant to the Endangered Species Act of 1973, as amended, that covers Preble's habitat take over the 30-year term of the permit.
Designation of Conservation Zones	Determined on a project-by-project basis.	Designation of the North Conservation Zone, South Conservation Zone, the High Line Canal Conservation Zone, and the Upper South Platte Properties, with the goals of: 1) prevention of disturbance to occupied and potential habitat through avoidance, minimization, and utilization of Best Management Practices (BMPs) when practicable, recognizing, however, that impacts in the conservation zones would occur; and 2) replacing occupied and potential habitat that is disturbed or removed by implementing BMPs and mitigation measures.
Habitat Conservation Plan	Determined on a project-by-project basis.	Developed as a requirement of the Incidental Take Permit.
Covered Activities	Determined on a project-by-project basis.	All operations, maintenance, foreseeable activities, and adaptive management activities identified as possibly occurring during the term of the Incidental Take Permit
Allowable Take	Determined on a project-by-project basis.	Total Take (Temporary and Permanent): 75 acres over 30 years; Temporary Take: No more than 25 acres at one time; Permanent Take: No more than 10 acres, however only 1 acre is anticipated.
Avoidance, Minimization, and Mitigation Related to Take	Determined on a project-by-project basis.	<p>Avoidance and Mitigation</p> <ul style="list-style-type: none"> ▪ Not engaging in the activity (avoidance); ▪ Conducting the activity in a different location outside of occupied or potential habitat (avoidance); ▪ Conducting the activity during the Preble's inactive season (avoidance); ▪ Decreasing the area of the activity (minimization); and ▪ Decreasing the duration of the activity (minimization). <p>Temporary Take:</p> <ul style="list-style-type: none"> ▪ Impact areas and successful restoration would be tracked in a project database; ▪ Once an impact area is successfully restored according to the Success Criteria (Denver Water 2003), that area would be deducted from the total impact area; ▪ The total impact area would not exceed 25 acres at any one time; and ▪ If impacts are anticipated to exceed 25 acres at any one time, Denver Water would consult with the Service to determine additional mitigation to offset the impacts exceeding 25 acres. Such additional measures may include enhancements or preservation on properties containing occupied or potential habitat. <p>Permanent Take:</p> <ul style="list-style-type: none"> ▪ Create up to 0.25 acre of riparian shrub and 2 acres of upland habitat at Lehow Lake; ▪ Revegetate social trails and dirt roads at Kassler that are no longer in use; and ▪ Create up to 0.25 acre of upland potential habitat at Long Lake Feeder Ditch. <p>(Note: the HCP covers up to a maximum of 10 acres of permanent impacts. In the event that permanent take exceeds the estimated one acre as discussed in the HCP, the additional impacts would be offset by dedicating a conservation easement at a ratio of 8:1 (i.e., if one additional acre of take occurs, Denver Water would dedicate 8 acres of an easement for Preble's habitat), by enhancements at a ratio of 2:1, or a combination of preservation (6:1) and enhancements (1:1), as defined by the HCP.)</p>

ACTIVITY	ALTERNATIVE A (NO ACTION; PROJECT-BY-PROJECT)	ALTERNATIVE B (PREFERRED ALTERNATIVE)
<i>Monitoring and Reporting</i>	Determined on a project-by-project basis.	<p>Compliance Monitoring: conducted to assure that the terms of the HCP are being met, and that authorized levels of take are not exceeded (performed by the Service with assistance with from Denver Water).</p> <p>Effectiveness Monitoring: conducted to determine if the anticipated impacts and amount of take from the covered activities are occurring, and if progress is being made toward the biological goals and objectives of the Habitat Conservation Plan.</p>

3.0 AFFECTED ENVIRONMENT

Detailed information describing the resources of the Denver Water system can be found in the publication *Water for Tomorrow – The History, Results, Projections and Update of the Integrated Resource Plan* (Denver Water 2002), or online at www.denverwater.org/howeare.

3.1 LOCATION AND GENERAL DESCRIPTION OF THE DENVER WATER BOARD PROPERTIES COVERED BY THE HABITAT CONSERVATION PLAN

The area covered by the ITP and HCP includes Denver Water properties in Boulder, Douglas, and Jefferson Counties that are at or below 7,600 feet elevation and have occupied or potential Preble's habitat within their boundaries. Descriptions of specific potential, occupied, and unsuitable habitat areas can be found in the HCP.

The water collection system is divided geographically into the North System and the South System (**Figure 8**). The North System is located in the foothills of the Rocky Mountains to the north and west of the Denver metropolitan area. The North System includes reservoirs (Gross and Ralston reservoirs, and Upper and Lower Long Lakes) that store water from South Boulder and Ralston creeks and trans-basin diversions that enter the system through the Moffat Tunnel collection system. The South Boulder diversion canal conveys water from Gross Reservoir on South Boulder Creek to Ralston Reservoir. The North System delivers water to the Moffat Treatment Plant through Conduits 16 and 22.

The South System is located in the Upper South Platte River watershed, upstream of Chatfield Reservoir. It is comprised of a series of storage reservoirs including Antero and Elevenmile reservoirs which are outside the HCP boundary, and Cheesman and Strontia Springs which are inside the permit boundary. The South System also includes trans-basin diversions from the Upper Colorado River through the Roberts Tunnel. The South System delivers water to Foothills and Marston treatment plants through Conduits 26 and 20, respectively.

The treated water system includes the Foothills, Marston, and Moffat treatment plants, 17 pump stations, 29 treated water storage reservoirs in 17 locations; and 2,464 miles of pipe with 35,022 valves and 13,298 hydrants.

As part of Denver Water's collection, treatment and distribution systems, Denver Water owns and operates several ditches used for delivery of non-potable water, including the High Line Canal, City Ditch, and the Farmers and Gardeners Ditch. Denver Water also owns various properties (including easements) throughout the North and South Systems.

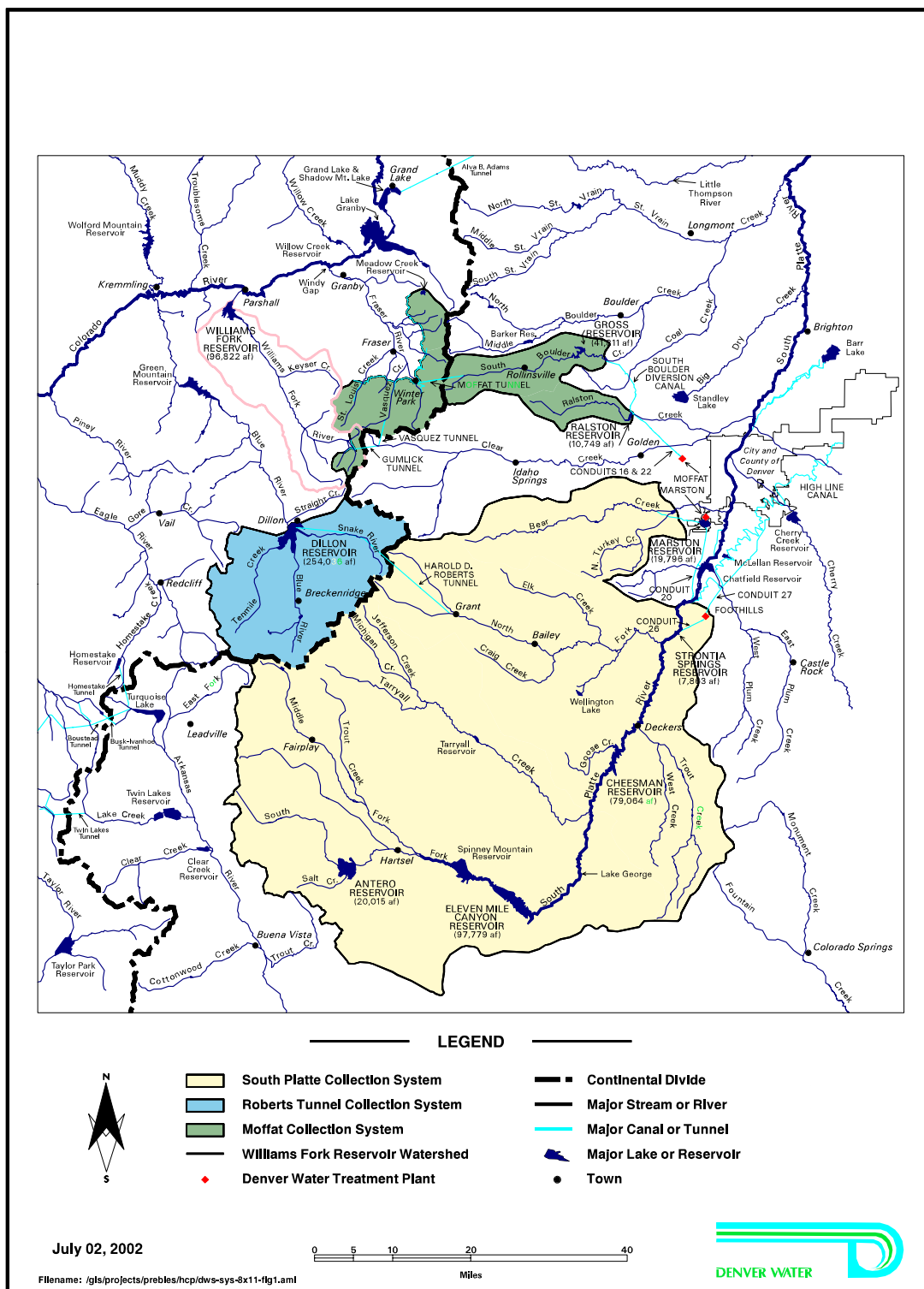


FIGURE 8. BOUNDARIES OF DENVER WATER'S WATER COLLECTION SYSTEM

3.2 DENVER WATER OPERATIONS

Denver Water has complete charge and control over the water works system supplying the City and County of Denver with water for all uses and purposes (see **Figure 1**). The system is municipally owned, but the structure of Denver Water provides for autonomy, including its own personnel and funds separate and apart from that of the general purpose government.

Denver Water's day-to-day operation of the system consists of two separate but interrelated components: the water collection system and the treated water distribution system. The water collection system includes all diversion, collection, and transmission facilities that store and distribute raw water prior to treatment (see **Figure 8**).

The water collection system provides water to the treated water system that, in turn, provides high-quality water at appropriate pressures to Denver Water's retail and contract customers. The entire system must be able to serve the daily and hourly demand variations typical of urban service areas.

3.3 WETLAND, RIPARIAN, AND AQUATIC RESOURCES

The U.S. Army Corps of Engineers defines wetlands as "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328). The state of Colorado defines wetlands using the same language as the U.S. Army Corps of Engineers (5 *Code of Colorado Regulations* (CCR) 1002-8, section 3.1.5). Colorado wetlands can be divided into four major types: riparian lands (including shrub-scrub wetlands), wet meadows, marshes, and peatlands (Jones and Cooper 1993). Wetlands are an important natural system because of the diverse biological and hydrologic functions provided. These functions may include water quality improvement, erosion protection, stormwater storage, groundwater recharge, nutrient cycling, pollution treatment, and provision of wildlife habitat and niches for unique flora and fauna.

Riparian areas, wetlands, and wet meadows in the planning area covered by the HCP are associated with the following creeks and tributaries: *Boulder County* – Coal Creek, Doudy Draw, Spring Brook, and South Boulder Creek; *Douglas County* – Plum Creek, Willow Creek, and Little Willow Creek; *Jefferson County* – Ralston Creek and Leyden Gulch; *Jefferson and Douglas* – South Platte River and some of its tributaries. Detailed accounts of the vegetation types present and their composition were available for some of these waterways, and were used to prepare the descriptions by drainage below.

3.3.1 South Boulder Creek

Wet meadows and plains riparian forests dominated plant communities along South Boulder Creek. Wet meadows supported a variety of grasses and forbs including reed canarygrass

(*Phalaris arundinacea*), Nebraska sedge (*Carex nebrascensis*), rushes (*Juncus* spp.), including Baltic rush (*Juncus balticus*), prairie cordgrass (*Spartina pectinata*), spikerush (*Eleocharis* spp.), including common spikerush (*Eleocharis palustris*), woolly sedge (*Carex lanuginosa*), and smartweed species (*Periscaria* spp.). The exotic Canada thistle (*Cirsium arvense*) has invaded many wetlands of South Boulder Creek. Prairie cordgrass associations were typically found in wet meadows of the floodplain and co-dominated with Baltic rush. Dogbane (*Apocynum* sp.) is a forb that frequently occurs in small patches in these grasslands. The riparian forests supported plains cottonwood (*Populus deltoides*) in the canopy, and narrowleaf cottonwood (*Populus angustifolia*) and sandbar willow (*Salix exigua*) in the shrub layer. The ground cover was dominated by forbs, including watercress (*Nasturtium officinale*), disk waterhyssop (*Bacopa rotundifolia*), cutleaf waterparsnip (*Berula erecta*), and meadow anemone (*Anemone canadensis*) (City of Boulder Open Space Department 1997).

3.3.2 Coal Creek

Typical emergent, aquatic, and riparian wetland vegetation supported by Coal Creek, at elevations where Preble's habitat exists, included cattails (*Typha* spp.), sedges (*Carex* spp.), spikerushes, bulrushes (*Scirpus* spp.), rushes, and duckweeds (*Lemna* spp.), a floating aquatic plant (Hazlett and Denham 1999). A few less common flowering aquatic plants found in the understory of Coal Creek riparian areas include pondweed (*Potamogeton gramineus*), aquatic buttercup (*Ranunculus aquatilis*), and water starwort (*Callitriche verna*) (Schorr, Peterson, and Fleming 1998; Hazlett and Denham 1999).

Typical riparian habitat at elevations where Preble's habitat exists has been described in detail for Coal Creek, and includes deciduous riparian forest that provided an average of 95% cover along the creek (Kittel et al. 1999). Plains cottonwood and narrowleaf cottonwood dominated the canopy providing up to 72% of the cover (52% plains cottonwood, 20% narrowleaf cottonwood). The understory shrub layer provided approximately 80% cover, and was dominated by willows including sandbar willow, (13%), mountain willow (*Salix monticola*) (24%), and dewystem willow (*Salix irrorata*) (36%). Forbs provided approximately 22% of the ground cover and were dominated by willow-herb species (14 %), including fringed willow-herb (*Epilobium ciliatum* ssp. *glandulosum*) in the wetter areas of the Coal Creek riparian corridor. Graminoids provided approximately 92% ground cover and included woolly sedge (21%) and reed canarygrass (17%) in the mesic sites near the creek.

The vegetation of Coal Creek at the Denver Water siphon crossing can be observed in **Figure 9**. The riparian vegetation associated with a nearby site included plains and narrowleaf cottonwoods, the exotic crack willow (*Salix fragilis*), sandbar willow, and thin-leaf alder (*Alnus tenuifolia*) (City of Boulder Open Space 2000).

3.3.3 Doudy Draw

Riparian and wetland communities along Doudy Draw can be characterized as mesic shrublands and mixed grasslands (Hogan 1994). Riparian areas are dominated by dense shrubs, including species of willows, with some stands of small cottonwoods. Upstream of the South



FIGURE 9. SOUTH BOULDER CANAL SIPHON CROSSING AT COAL CREEK

Boulder Canal crossing, a wetland plant association was identified and supported Baltic rush, Rocky Mountain rush (*Juncus saximontana*), Nebraska sedge, and water horehound (*Lycopus americanus*). The exotic/invasive Canada thistle was also present in this association (Kettler, Lederer, and Hogan 1993). The vegetation of Doudy Draw at the Denver Water siphon crossing can be observed in **Figure 10**.

3.3.4 Ralston Creek

The Ralston Creek Habitat Conservation Site supported shrub-scrub wetlands dominated by cottonwood, willow, wild currant (*Ribes* sp.), and thin-leaf alder. The understory at these sites supported exotics, including thistles (*Cirsium* sp.), as well as horehound (*Marrubium vulgare*) (Schorr, Peterson, and Fleming 1998).



FIGURE 10. SOUTH BOULDER CANAL SIPHON CROSSING AT DOUDY DRAW

Other wetlands described along Ralston Creek supported willow, wild currant, and thin-leaf alder, which provided tall shrub cover. The understory of these wetlands was dominated by wetland species including sedges, broad-leaved cattail (*Typha latifolia*), and reed canarygrass. The Upper Ralston Creek Conservation Site riparian wetlands also supported wetland shrubs such as birch (*Betula* sp.) and alder. Two small wetland patches, dominated by sedge species, are also located on this site (Schorr, Peterson, and Fleming 1998; Pague, Rondeau, and Duff 1993).

Vegetation of the Long Lake Feeder Ditch (**Figure 11**), which conveys water from Lower Ralston Creek to Upper and Lower Long Lakes, includes a shrub layer consisting of willows, and some sedges in the understory.

3.3.5 Plum Creek

Although limited data exists on wetland, riparian, and aquatic plant associations along Plum Creek at elevations where Preble's habitat exists, some plant communities have been described in detail. The plains cottonwood/chokecherry (*Prunus virginiana*) riparian woodland association has been characterized where Preble's habitat occurs on Plum Creek, and is typical of the riparian habitat along this creek (Kittel, VanWie, and Damm 1998).

This plains cottonwood/chokecherry association was dominated by plains cottonwood in the riparian forest canopy at two sites (approximately 76% and 77% cover). The dominant shrubs in this association included chokecherry, which provided approximately 27% and 29% cover,



FIGURE 11. LONG LAKE FEEDER DITCH

and western snowberry (*Symphoricarpus occidentalis*), which provided approximately 13% and 44% cover, at the two sites. The forb layer of this association on Plum Creek was dominated by the exotic hound's tongue (*Cynoglossum officinale*), which provided approximately 8% and 21% cover. Graminoids supported by the plains cottonwood/chokecherry association included the exotic smooth brome (*Bromus inermis*) at both sites (approximately 12% and 26% cover at the two sites). Western wheatgrass (*Pascopyrum smithii*) dominated the graminoid layer at the first site (approximately 23%), while Canada wild-rye (*Elymus canadensis*) was the second most common graminoid at the second site, providing approximately 16% cover (Kittel, VanWie, and Damm 1998).



FIGURE 12. HIGH LINE CANAL CROSSING AT PLUM CREEK

creek (Ensign Technical Services 2001).

The vegetation of Plum Creek at the High Line Canal siphon crossing can be observed in **Figure 12**. Denver Water property at this site includes both the canal and the siphon under the creek. This Denver Water siphon occurs within approximately 0.1 mile of the Conduit 27 crossing with Plum Creek. At this crossing, the north bank of the High Line Canal had a shallow bench that supported an open cover of emergent sandbar willow, which increased in density towards the access road. Plum Creek itself supported a heavy stand of cottonwood and large stands of cattail. An upland grassland component separated the High Line Canal and the cottonwood forest of the

3.3.6 Little Willow Creek

Data sources describing wetland and riparian habitat on Little Willow Creek are limited. However, a site located less than 0.1 mile from a Conduit 133 crossing at Little Willow Creek has been described as having a very narrow riparian corridor characterized by dense areas of sandbar willow and scattered plains cottonwood trees. The understory consisted mostly of wetland species such as broadleaf cattail, watercress, arrowhead (*Sagittaria latifolia*), and reed canarygrass (ERO 2001). **Figures 13 and 14** show Little Willow Creek at the Conduit 26 crossing, and Little Willow Creek upstream of the Conduit 26 crossing, respectively. The Little Willow Creek photographs show relatively mature, peach-leaf willow (*Salix amygdaloides*), sandbar willow, and sapling cottonwoods in the drainage.

3.3.7 South Platte River

The South Platte River supports many wetland and riparian types, providing a variety of habitats. In Chatfield State Park, above the reservoir, shrub-scrub emergent wetlands were found along the riverbanks, in old oxbows or sloughs, and on point bars and islands within the river (Chatfield State Park 1995). Vegetated point bars, islands, and riverbanks were dominated by a shrub-scrub wetland comprised of sandbar and peach-leaf willow as well as seedling/sapling plains cottonwood. These wetlands supported a dense understory of reed canarygrass, Emory sedge (*Carex emoryi*), redtop (*Agrostis gigantea*), the exotic quackgrass (*Elytrigia repens*), aster (*Aster* spp.), and horsetweed (*Conyza canadensis*) (Chatfield State Park 1995). The deep scour pools, oxbows, and point bars of the South Platte River above Chatfield Reservoir also provide habitat for emergent wetland communities. These communities were dominated by softstem bulrush (*Scirpus lacustris*) and broad- and narrow-leaved cattail (*Typha angustifolia*), which grow in water up to three feet deep (Chatfield State Park 1995). Mats of duckweed occur on the standing water among emergent vegetation, where species of algae also grow. Saturated wetland soils adjacent to the standing water support three-square bulrush (*Scirpus pungens*), reed canarygrass, redtop, saltgrass (*Distichlis spicata* ssp. *stricta*), showy milkweed (*Asclepias speciosa*), and yellow-evening primrose (*Calylophus serrulatus*) (Chatfield State Park 1995).

Surface flows and high groundwater tables, primarily due to the construction of Chatfield Dam, but also a result of beaver dam and access road construction, have resulted in the establishment of large shrub-scrub and emergent wetlands along the lower South Platte River floodplain in Chatfield State Park (Chatfield State Park 1995). Nearly pure stands of sandbar and peach-leaf willow, plains cottonwood saplings, broad-leaved cattail, and cocklebur (*Xanthium strumarium*) were present. Typically, cocklebur and barnyard grass (*Echinochloa crus-galli*) occupy the drawdown zones, broad-leaf cattail occupies areas saturated to the surface or inundated to 1-foot deep, while Emory's sedge (*Carex emoryi*) and Torrey rush (*Juncus torreyi*) occupy areas where soils were saturated at the surface or from 6 to 12 inches below the surface (Chatfield State Park 1995). Other species associated with wetlands of this reach included spikerush, redtop, reed canarygrass, and foxtail barley (*Hordeum jubatum*). The exotics Canada and musk thistle (*Carduus nutans*), mullein (*Verbascum thapsus*), and quackgrass are of management concern in these wetlands (Chatfield State Park 1995).



FIGURE 13. CONDUIT 26 CROSSING AT LITTLE WILLOW CREEK



FIGURE 14. LITTLE WILLOW CREEK UPSTREAM OF THE CONDUIT 26 CROSSING

Shrub-scrub wetlands growing on the upper margins of the emergent communities, and also on old point bar and island deposits, were occupied by sandbar willow and Wood's rose (*Rosa woodsii*) shrubs, as well as sapling peachleaf willow, plains cottonwood, and the exotic Russian-olive (*Elaeagnus angustifolia*). These species also comprised the understory of forested wetland communities at Chatfield State Park, dominated by peachleaf willow, plains cottonwood, and Russian-olive (Chatfield State Park 1995).

Plant associations found in the South Platte River riparian corridor included the sandbar willow/mesic graminoid shrubland, the sandbar willow/bare ground shrubland, and the plains cottonwood/western snowberry forest. The sandbar willow/mesic graminoid stand supported sparse vegetation, with sandbar willow providing 19% crown cover in the overstory and Wood's rose providing 4% cover. Yarrow (*Achillea millefolium* var. *alpicola*) was the dominant forb, but provided only 2% ground cover, as did an unknown forb. Sedge species were the dominant graminoids supported in this stand with a cover of approximately 4%. The exotic smooth brome, along with Baltic rush also contributed to the ground cover, each providing approximately 3% cover (Kittel et al. 1999).

The sandbar willow/bare ground association identified along the South Platte River in Waterton Canyon had a canopy cover of Rocky Mountain juniper (*Juniperus scopulorum*) (50%), sandbar willow with a crown cover of 62%, and sedge species with a ground cover of 13% (Kittel et al. 1999). The plains cottonwood/western snowberry association supported plains cottonwood, which provided 78% cover in the canopy; western snowberry (7% cover), and sandbar willow (2% cover), in the shrub layer; the noxious leafy spurge (*Euphorbia esula*), which provided approximately 6% cover, riverbank grape (*Vitis riparia*) providing 3% cover, and the exotic smooth brome providing 11% cover, in the understory (Kittel et al. 1999).

Cottonwood stands and small willow patches have also been noted in Waterton Canyon on Denver Water properties (Ensign Technical Services 2000). Just outside the boundaries of the Kassler and Waterton Canyon properties, upstream on the South Platte River, the riparian habitat supported plains cottonwood, peach-leaf willow, box elder (*Acer negundo*), sedges, and rushes.

Figures 15 and 16 are photographs of the South Platte River near Trumbull (approximately 7,000 feet elevation). A site on Wigwam Creek, approximately one-half mile from its confluence with the South Platte River near Deckers, Colorado, supported vegetation typical of the South Platte and its tributaries at this elevation. The riparian area at this site was dominated by a healthy willow-alder riparian shrub community. The common shrubs supported included sandbar and mountain willow, red-osier dogwood (*Cornus sericea*), and alder (Meaney 2000).

3.3.8 Plant Communities Tracked by Colorado Natural Heritage Program

The Colorado Natural Heritage Program tracks and ranks Colorado's plant communities, and provides information and expertise on these resources to promote the conservation of valuable biological resources in the state. Riparian plant communities monitored by the Colorado Natural Heritage Program, and which may occur within the planning area covered by the HCP, include the *Salix monticola*/mesic forb (montane riparian willow carr) community, the *Alnus*



FIGURE 15. SOUTH PLATTE RIVER NEAR TRUMBULL, COLORADO



FIGURE 16. SOUTH PLATTE RIVER FLOODPLAIN NEAR TRUMBULL, COLORADO

incana/mesic forb (thinleaf alder/mesic forb riparian shrubland) community, the *Betula occidentalis*/mesic forb (foothills riparian shrubland) community, the *Pinus ponderosa*/*Alnus incana* (ponderosa pine/thinleaf alder) community, and the *Pseudotsuga menziesii*/*Betula occidentalis* (montane riparian forest) community (CNHP 2003).

3.3.9 General Aquatic Habitat of Boulder, Denver, and Jefferson Counties

The aquatic habitat within the planning area covered by the HCP, in relation to habitat for species of concern, is present in the creeks noted previously and the South Platte River. The creeks and rivers are typically meandering in the mountains, with rocky channels and boulder- and cobble-sized deposits. They turn braided with cobble- and sand-sized deposits in the foothills and the plains, where stream gradients are lower. Even with numerous hydrologic modifications (e.g., dams, diversion canals) altering streamflows, flow rates can vary from dry in the fall and winter to flood stage in the spring and summer.

In the planning area covered by the HCP, small- to medium-sized creeks, as well as the South Platte River and some of its tributaries, provide habitat for a variety of introduced and native fish species, including the state-listed species discussed in Section 3.6, Threatened and Endangered Species and Species of Special Concern. The availability of gravelly riffles, runs, and pools, as well as water temperatures, turbidity (i.e., level of sedimentation), and substrate (i.e., sandy to rocky bottoms), generally dictate what species will occur in a drainage. The waterways in Boulder, Douglas, and Jefferson Counties encompass a range of aquatic habitat, from quick-moving, rock- and gravel-bottomed, clear, cool streams in the mountains, to slower-moving, sandy-bottomed, turbid, and warm streams in the plains.

3.4 FLOODPLAINS

3.4.1 Introduction

A floodplain is defined by the state of Colorado as “the area of land susceptible to being inundated as a result of the occurrence of a flood, including the area of land over which floodwater would flow from the spillway of a reservoir” (2 CCR 408-1). Floodplains are often fertile areas where sediment high in nutrients has been deposited during flood events, and as the floodwaters recede, these sediments and nutrients form new soils.

Wetland and riparian habitats typically grow within floodplains and can be affected by flood events. The same flooding that enriches the floodplain of streams and creeks also loads sediment and nutrients into surface water bodies. Because varying stream velocity and sediment load alter the riparian system, including its vegetation, flooding has the potential to affect Preble’s and its habitat.

3.4.2 Physical Characteristics of Colorado Front Range Floodplains

Holocene alluvium has been deposited in the valleys and floodplains of the principle streams throughout the Denver Basin geologic region. Composed of gravel, sand, silt, and clay, these deposits represent the youngest alluvial deposits in the region and include Piney Creek, Post-Piney Creek, and Broadway Alluvium. Piney Creek Alluvium is found 4 to 20 feet above present day streams and Post-Piney Creek Alluvium is found at depths of 1.5 to 20 feet (City of Boulder Open Space Department 1997). Post-Piney Creek Alluvium is important to riparian systems because it can cover the entire floodplain of modern streams and exhibits little or no soil development (Costa and Bilodeau 1982). It is typically a grayish-brown, humic fine sand and silt containing gravel and cobbles. Broadway alluvium is as thick as 100 feet and contains gravel- to boulder-sized particles.

Erosion, compaction, and pollution are major environmental factors that influence the ability of a floodplain to retain water. Compaction of soils inhibits the water holding capacity and storage ability of floodplains, increasing the magnitude of floods and causing a destructive cycle of flooding, streambed aggradation, and streambank erosion. Reduction in the ability of soil to retain water due to compaction reduces the water storage potential and accessibility for sustaining vegetation, thereby further reducing productivity in the floodplain. Because soil development is partially dependent upon microbes and earthworms, pollution can reduce soil viability and chemical structure, thus the ability to support plant life.

3.4.3 Floodplain Values

Floodplains provide many valuable services to the community in which they are located, some of which have obvious economic values, and others which have aesthetic values. Floodplains provide natural flood and erosion control by: (1) providing areas where flood waters are stored; (2) reducing flood velocities, providing more time for people to react to floods; (3) reducing peak flood levels in creek channels; and (4) reducing sedimentation of creek channels during flood events. Floodplains help maintain water quality by filtering nutrients and impurities from surface water runoff bound for a creek, processing organic wastes, and helping to moderate temperature fluctuations. Floodplains also assist in recharging groundwater through infiltration and recharge of aquifers, and by slowly releasing water to reduce infrequency and duration of low surface flows. In addition to helping maintain water quality, floodplains also provide valuable services for biological resources, such as providing breeding and feeding habitat for many species, and helping to protect habitat for rare and endangered species (WDNR 1999).

3.4.4 Upland Floodplain Plant Communities

At elevations where Preble's habitat is known (less than 7,600 feet), the floodplains of Boulder, Douglas, and Jefferson Counties support wetland, riparian, and plains upland vegetation. This vegetation transitions from the wetland and riparian plant communities on terraces near the stream, to upland vegetation on floodplain terraces further from the stream, and even beyond the floodplain, where Preble's are known to day-nest, forage, and hibernate. Wetland and riparian vegetation is described in detail in Section 3.3, Wetland, Riparian, and Aquatic

Resources, as descriptions were available. Therefore, this section will focus on the upland floodplain plant communities, which occupy the area between the riparian and upland communities on the upper on the upper floodplain terraces.

Boulder County

Vegetation supported by the outer floodplains and plains, upland areas of Boulder County include tallgrass prairies and native/nonnative bottomland grassland (City of Boulder Open Space Department 1997). Sites supporting tallgrass species are typically associated with irrigated or sub-irrigated lands within the floodplain. This community is dominated by big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), and yellow Indian grass (*Sorghastum nutans*). In many of the floodplain grasslands and wet meadows, tallgrass species are co-dominant with introduced perennial grasses, including smooth brome and redbud. The native/nonnative bottomland grassland is representative of irrigated and non-irrigated agricultural lands used for grazing or hay production. Nonnative species include smooth brome, meadow fescue (*Festuca pratensis*), Kentucky bluegrass (*Poa pratensis*), and orchard grass (*Dactylis glomerata*). Some agricultural lands may have scattered stands of native species, which is frequently big bluestem (City of Boulder Open Space Department 1997).

Figure 10 illustrates the upland floodplain vegetation of the South Boulder Canal siphon crossing at Doudy Draw which is on the Boulder and Jefferson County line. It should be noted that hawthorn was the dominant shrub in the upland floodplain plant communities of Doudy Draw, and that a large stand of smooth brome dominated the upland floodplain vegetation less than one mile upstream of the Denver Water siphon crossing with Doudy Draw (Kettler, Lederer, and Hogan 1993, and Hogan 1994).

Douglas County

Vegetation supported by the floodplains of Douglas County include shortgrass, mid-grass, and tallgrass prairies. Sites supporting tallgrass species are typically associated with irrigated or sub-irrigated lands within a floodplain or in the riparian corridor. Many native/nonnative bottomland grasslands are representative of irrigated and non-irrigated agricultural lands used for grazing or hay production. The shortgrass prairie supports buffalo grass (*Buchloe* sp.), blue grama (*Bouteloua gracilis*), western wheatgrass, and needle-and-thread grass (*Hesperostipa comata*) among others (CDOW-HRS 1998). In more mesic sites on terraces closer to the stream, the mid-grass prairie supports sideoats grama (*Bouteloua curtipendula*), galleta (*Hilaria jamesii*), foxtail barley, western wheatgrass, bluebunch wheatgrass (*Pseudoroegneria spicata*), little bluestem (*Schizachyrium scoparium*), New Mexico feathergrass (*Stipa neomexicana*), and green needlegrass (*Nassella viridula*). The tallgrass prairie is dominated by big bluestem, little bluestem, and Indiangrass (CDOW-HRS 1998).

Figures 12 and 13 illustrate the floodplain vegetation along Little Willow Creek at and upstream of the conduit 26 crossing. At these locations, rabbitbrush (*Chrysothamnus* sp.) and species of bunchgrasses provided the dominant floodplain (upland) habitat. At a site supported on Little Willow Creek less than 0.1 mile from a crossing with Conduit 133, the adjacent

upland plant community was described as a shortgrass prairie dominated by the exotic smooth brome, yucca (*Yucca glauca*), and prickly pear cactus (*Opuntia polyacantha*) (Ensight 2000).

Floodplain vegetation at a site described in the Plum Creek drainage supported species including redbud, Canada goldenrod (*Solidago canadensis*), and ponderosa pine (*Pinus ponderosa*) (ERO Resources 2000). At the High Line Canal crossing under Plum Creek a greater component of upper floodplain shrubs and vines was supported on the south bank. There was also an abrupt transition to a rubber rabbitbrush (*Ericameria nauseosa*) type (Ensight Technical Services 2001).

Floodplain vegetation at sites along the South Platte River included wild rose (*Rosa* sp.), rabbitbrush, orchard grass, and smooth brome (Greystone 2002). Species of rose and rabbitbrush were observed in upper floodplain shrub layer of a site near the South Platte River. Smooth brome, western wheatgrass, and blue grama were the typical graminoids supported at this site (Meaney et al. 2000). **Figure 16** illustrates the vegetation of the floodplain along the South Platte River near Trumbull.

Jefferson County

Vegetation supported by the floodplains of Jefferson County include shortgrass, mid-grass, and tallgrass prairies. Sites supporting tallgrass species are typically associated with irrigated or sub-irrigated lands within a floodplain, or in the riparian corridor. Many native/nonnative bottomland grasslands are representative of irrigated and non-irrigated agricultural lands used for grazing or hay production. Shortgrasses such as buffalo grass, blue grama, western wheatgrass, and needlegrass (*Stipa* sp.) are supported. Trees and shrubs, including mountain mahogany (*Cercocarpus montanus*) and rabbitbrush, are also present while wildflowers, such as prairie coneflower (*Ratibida columnifera*), goldenaster (*Heterotheca villosa*), butterfly plant (*Gaura coccinea*), blazing star (*Mentzelia* spp.), and white prickly poppy (*Argemone polyanthemosa*), were observed in the spring and summer (Bailey 1995). Remnant tallgrass prairie stands occur where the precipitation increases along the foothills, providing sufficiently wet conditions for this tallgrass prairie component to exist with shortgrass species. The dominant vegetation of tallgrass prairie stands are big bluestem, little bluestem, and Indiangrass. The tallgrass prairie habitat decreases in extent from north to south along the Front Range.

Species preferring drier sites in the riparian corridor of Ralston Creek included the exotic smooth brome, common sunflower (*Helianthus annuus*), and wild rose. The understory was often invaded by exotic grasses and thistles, as well as horehound (Pague, Rondeau, and Duff 1993; Schorr, Peterson, and Fleming 1998). Along Coal Creek, exotics/invasives noted to occur in upland floodplain habitat included the graminoids creeping bentgrass (*Agrostis stolonifera*) and smooth brome (Kittel et. al 1999).

On the Rocky Flats Environmental Technology Site, tall upper floodplain shrublands comprised of stands of hawthorn (*Crataegus* spp.), chokecherry, and occasionally American plum (*Prunus americana*) were present. Currant species were also found in the upper floodplain shrubland (Murdock, pers. com. 2001). Sites along Coal Creek were typically

recovering from the impacts of grazing. Much of the understory at these sites supported the exotic cheatgrass (*Bromus tectorum*) and native poison ivy (*Toxicodendron rydbergii*). Fleshy hawthorn (*Crataegus macracantha*) dominated the vegetation at a site near the access road for South Boulder Canal and the siphon at Coal Creek. **Figures 9 and 10** show the floodplain vegetation at the South Boulder Canal siphon crossings at Coal Creek and Doudy Draw.

Upper floodplain vegetation at sites considered suitable for Preble's along the South Platte River included chokecherry, wild rose, rubber rabbitbrush, orchard grass, and smooth brome (Greystone 2002). Species of rose, currant, and rabbitbrush were observed in the shrub layer of a site near the South Platte River while smooth brome, western wheatgrass, and blue grama were the typical graminoids supported on the upper floodplain (Meaney et al. 2000).

3.4.5 Communities Tracked by the Colorado Natural Heritage Program

The Colorado Natural Heritage Program tracks and ranks plant communities, and provides information and expertise on these resources to promote the conservation of valuable habitats within the state. Upper floodplain plant communities monitored by the Colorado Natural Heritage Program, and which may occur within the planning area covered by the HCP include the *Andropogon gerardii*-*Schizachyrium scoparium* (xeric tallgrass prairie) community and the *Andropogon gerardii*-*Sporobolus heterolepis* (xeric tallgrass prairie) community.

3.5 THREATENED AND ENDANGERED SPECIES, AND SPECIES OF SPECIAL CONCERN

This section identifies both federal and state listed species identified by a number of sources as potentially occurring within the HCP boundary. First, a list of the federal species known to occur, or considered likely to occur, on Denver Water properties is provided, followed by a brief description of the range and habitat requirements for each species. More detailed information is provided for Preble's as this species is covered by the HCP. Second, a table (Table 4) of federal species that have not been identified on Denver Water properties, but that are known to occur along the Front Range, is provided, including a brief description of the habitat requirements for each species (see Appendix B for further details on these federally listed species). Finally, state listed species are introduced and the reader is directed to Table 4 and Appendix C for further detailed descriptions. Federal and state listed species are separated because the federal listings are statutory, whereas the state listings are not.

3.5.1 Federally Listed Species Known or Considered Likely to Occur on Denver Water Properties

Under the Act, an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. A candidate species is defined as a species for which

information indicates that listing is justified. A proposed species is any species of fish, wildlife, or plant that is proposed in the *Federal Register* to be listed under section 4 of the Act. On 21 January 2003, the Service provided a list (below) of federal threatened, endangered, candidate, and proposed species known or considered likely to occur on Denver Water properties covered by the HCP (Linder pers. comm. 2003). However it should be noted that the HCP and ITP cover only Preble's, and do not cover the take of other federally-listed species identified below.

Preble's meadow jumping mouse	(<i>Zapus hudsonius preblei</i>)
Bald eagle	(<i>Haliaeetus leucocephalus</i>)
Pawnee montane skipper	(<i>Hesperia leonardus montana</i>)
Ute ladies'tresses	(<i>Spiranthes diluvialis</i>)

Preble's Meadow Jumping Mouse. [Federal Threatened; Colorado Threatened] The Preble's is a member of the Dipodidae family and is one of 12 recognized subspecies of the meadow jumping mouse (Hafner et al. 1981). Although the meadow jumping mouse is widely distributed across North America, the Preble's subspecies is found only in the Front Range of Colorado and in southeastern Wyoming. They are restricted to riparian and relatively close upland habitats in Colorado, which is a small proportion of the landscape. Preble's are known in Colorado from records that date back to the 1890s, with most of the information on the species limited to distribution records until 1991. Historically, Preble's was found in Colorado in Larimer, Weld, Boulder, Jefferson, Adams, Denver, El Paso, and Arapahoe counties (NatureServe 2002). Extant occurrences are in Boulder, Jefferson, Douglas, Elbert, Larimer, Weld, Teller, and El Paso counties (NatureServe 2002). It is likely that they have been extirpated from Denver and Adams counties in recent times. Because many riparian areas are being altered by a variety of anthropogenic (human-caused) factors that are detrimental to Preble's, it was officially listed as "threatened" in May, 1998 under the Act.

Preble's habitat, which is typified by dense, riparian vegetation with associated floodplain and upland grasslands and shrublands, is considered to extend 300 feet beyond the 100-year floodplain associated with the creeks of Boulder, Douglas, and Jefferson Counties (Armstrong et al. 1997). Recent proposed critical habitat designations would extend up to 460 feet from the stream edge (67 FR 47154 17 July 2002). The riparian vegetation component has variable composition, but shrub patches with scattered tree overstory is common. Riparian woody vegetation usually has a heavy understory of graminoids or herbs, and woody or leaf litter is often abundant. Soils are often saturated for enough of the growing season to support riparian shrubs and trees. The common vegetation theme in riparian areas is heavy cover with minimal open areas. However, Preble's do occupy areas with variable coverage on a larger scale. Riparian habitat is the primary Preble's nesting area, but feeding, mating, hibernation, and dispersal are strongly suspected in this area as well. Preble's have been found on a variety of stream types. Streams may be braided or meandering, with permanent or intermittent flows. They often have shallow banks (less than one meter in height), with a lateral saturated zone that can support riparian vegetation to a width that is usually at least 3 meters.

Riparian stream systems in Colorado are subject to a variety of disturbance factors that affect the Preble's lifecycle. Beyond loss of suitable riparian habitat, a chief concern is flooding.

Many Colorado streams have peak hydrographs in early to mid June but also have storm events in early to mid-May. The timing and intensity of storm events may affect hibernating Preble's, which emerge from underground hibernacula from early to late May.

Preble's are among the most profound of mammalian hibernators, with the hibernation period estimated at 189 days (Armstrong et al. 1997). Adult Preble's begin to fatten in mid-August and are often in hibernation by 15 September (Pawnee Nat. History Soc. 1996). Juveniles born in August take longer to build fat reserves, which must reach about 20% of body weight for over-winter survival, and may be active until late October before they finally acquire the necessary fat reserves to hibernate. The earliest known date of emergence in Colorado is 2 May, but most Preble's emerge around mid-May, with males emerging first (Bakeman et al. 1995). Hibernacula are usually located in upland positions removed from the riparian area, often in association with shrub patches. Upland habitat includes a variety of mid to tall grass types with upland shrub patches. Alfalfa fields are also used for habitat in some situations. These grasslands are usually at higher elevations than the immediate flood plain and would not be flooded during regular flood events, unlike much of the lower elevation riparian habitat. Schorr (2000) found four hibernacula at the base of willow shrub stands, and two at the base of gambel oak. Hibernacula were an average of 22.6 meters from the edge of the associated waterway. Shenk and Sivert (1999) found eight potential hibernacula at three sites in Douglas County. All sites were associated with shrubs or trees and ranged from 23 to 341 meters from the main drainage, and from 10–105 meters from associated tributaries. Hibernacula are within underground burrows (30 cm depth, Armstrong et al. 1997) lined with leaves and other organic materials. Food is not stored, so survival is dependent on fat reserves. Preble's may move considerable distances to find hibernation areas, including up dry tributaries (Shenk and Sivert 1999). Upland habitat with shrub or tree cover, in association with riparian areas, should be considered potential areas for hibernation.

Preble's are known to exist in some ditch/canal habitats in Boulder and Douglas counties. Preble's have been found on some ditches in close proximity to South Boulder Creek (Meaney et al. 2001) and St. Vrain Creek (Ensight 1997) in Boulder County. They were recently discovered on a section of the High Line Canal near Plum Creek at Chatfield State Park in Douglas County (Ensight 2001). Occupied ditch segments often have a well-developed shrub layer on the ditch banks. However, there have been many ditch surveys where Preble's have not been found even with the presence of heavy shrub layers. It appears that in the majority of cases where Preble's have been found on ditches, the occupied sites are in relatively close proximity to a natural stream drainage (South Boulder Creek [Meaney et al., 1997], St. Vrain Creek [Meaney et al., 1996], Plum Creek [Ensight 2001]). It is suspected that some occupied ditches may have resident Preble's (South Boulder Creek), or Preble's may use the ditch for dispersal or hibernation (Plum Creek).

Connectivity of habitat patches is closely related to hydrologic pathways because Preble's movement is correlated with riparian corridors. However, Preble's have occasionally been captured in upland habitats at considerable distances from drainage pathways. Examples include captures in agricultural fields in Boulder County that are considerable distances from the South Boulder Creek floodplain. Preble's habitat within a drainage may have riparian patches with thick cover interspersed with open patches. Open patches may be used for dispersal routes between the occupied patches.

Barriers prevent Preble's movement and can fragment populations. Information from several studies show that Preble's are surprisingly mobile when confronted with unfavorable habitat conditions. Preble's movement has been documented through a 93 meter-long (305 feet) concrete box culvert under I-25 on Dirty Woman Creek, with adult, juvenile, male and female Preble's successfully passing through the culvert (Ensight 1999). On the same drainage, Preble's have moved past secondary roads where the stream is conducted through corrugated metal pipes, as well as through a town park that has remnant riparian vegetation that averages 15 meters (49 feet) in width. It is not known whether such movement across secondary roads occurs over the roads or through the culverts, but movement at I-25 is almost certainly via the culvert.

Based on the relatively few known historical records, it is likely that Preble's were never abundant in Colorado. They appear to be a small proportion of the small mammal community where they are found, generally less than 5% of the small mammals in riparian habitats (Armstrong et al. 1997). Work began in 1998 to develop Preble's abundance estimates in several areas in Colorado from mark-recapture methods. Density estimates were calculated for sites in Boulder, Jefferson, Douglas, and El Paso counties in Colorado. The two-year mean (1998-1999) of all sites was 32 animals/km of stream (Table 1). Density estimates ranged from approximately 5 animals km⁻¹ stream at Rocky Flats (Jefferson County), to 47 animals km⁻¹ stream at the U.S. Air Force Academy in El Paso County. Work has continued in many of these areas from year 2000 to the present. These data indicate that Preble's density may vary considerably from one year to the next.

Most of the mid- to lower-elevation Denver Water properties that have potential habitat could support moderate to low density populations, based on nearby sampling at South Boulder Creek, Pinecliff Ranch, and Rocky Flats. This would include populations on Coal, Ralston, and South Boulder Creek. Populations have not been sampled extensively on larger streams or in upper-elevation habitats in the vicinity of or on Denver Water properties, so the status of populations along the South Platte River is difficult to estimate.

Preble's are omnivores, taking advantage of whatever food supplies are available. As might be expected, they have seasonal variations in diet. A variety of arthropods, including soil larvae, probably constitute the bulk of the diet upon emergence in Spring. Fungi are also consumed during this period. As the active season progresses, grass seeds become the favored food item. Arthropods supplement the diet as Preble's begin to fatten prior to hibernation.

Bald Eagle. [Federal Threatened; Colorado Threatened] The breeding range of the bald eagle includes central Alaska, northern Yukon, northwestern and southern Mackenzie, northern Saskatchewan, northern Manitoba, central Ontario, central Quebec, Labrador, and Newfoundland, south locally to the Commander and Aleutian Islands, southern Alaska, Baja California (both coasts), Sonora, New Mexico, Arizona, Texas Gulf Coast, and Florida (including the Keys). Breeding is very local in the Great Basin and Prairie and Plains regions in interior North America, where breeding range recently has expanded to include Nebraska and Kansas. The non-breeding range generally occurs throughout the breeding range except in the far north; most commonly from southern Alaska and southern Canada southward. Winter concentrations occur in British Columbia-northwestern Washington, along the Missouri and Mississippi rivers, and in northern Arkansas. One of the largest fall (mid-October to mid-

December) migrant concentrations (200–300 birds at any one time, close to a thousand individuals through the season) occurs at Hauser Lake near Helena, Montana.

Breeding habitat most commonly includes areas close to (within 4 km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds (Andrew and Mosher 1982, Green 1985, Campbell et al. 1990). Bald eagles usually nest in tall trees or on cliffs near water. Nest trees include pines, spruce, firs, cottonwoods, oaks, poplars, and beech. Ground nesting has been reported on the Aleutian Islands in Alaska, in Canada's Northwest Territories, and in Ohio, Michigan, and Texas. Nests located on cliffs and rock pinnacles have been reported historically in California, Kansas, Nevada, New Mexico and Utah, but currently are known to occur only in Alaska and Arizona. The same nest may be used year after year, or eagles may alternate between two nest sites in successive years. In British Columbia, nests with overhead canopy of foliage were most successful (Palmer 1988). In Oregon, most nests were within 1.6 km of water, usually in the largest tree in the stand (Anthony and Isaacs 1989). In Colorado and Wyoming, forest stands containing nest trees varied from old-growth ponderosa pine to narrow strips of riparian vegetation surrounded by rangeland (Kralovec et al. 1992).

Bald eagles preferentially roost in conifers or other sheltered sites in winter in some areas; typically selecting the larger, more accessible trees (Buehler et al. 1991a, 1992). Perching in deciduous and coniferous trees is equally common in other areas (e.g., Bowerman et al. 1993). Communal roost sites used by two or more eagles are common, and some may be used by 100 or more eagles during periods of high use. Communal roosts are often reused in subsequent years. Winter roost sites vary in their proximity to food resources (up to 33 km) and may be determined to some extent by a preference for a warmer microclimate at these sites. Available data indicate that energy conservation may or may not be an important factor in roost-site selection (Buehler et al. 1991b). Wintering areas are commonly associated with open water though in some areas eagles use habitats with little or no open water if other food resources (e.g., rabbit or deer carrion) are readily available. This species usually avoids areas with nearby human activity (boat traffic, pedestrians) and development (buildings) (Buehler et al. 1991c).

Pawnee Montane Skipper. [Federal Threatened; Colorado Endangered] The only known population of this butterfly occurs on the Pikes Peak Granite Formation in the South Platte River drainage system in Colorado. The total range of the species appears to be centered on Deckers, Colorado, extending northwestward to just beyond Pine, Colorado and southward to the near-convergence of Teller, Park, Jefferson, and Douglas county lines. This species range is approximately 23 miles long and 5 miles wide. Estimated total habitat within this area is 37.9 square miles. The area occupied by the skipper is owned and/or administered by the Denver Water Board, Colorado State Land Board, the Bureau of Land Management, the U.S. Forest Service (Pike National Forest), Jefferson County, and private individuals. The Pawnee montane skipper inhabits dry, open ponderosa pine woodlands with sparse understory at 6,000 to 7,500 ft elevation. Sites have moderately steep slopes and soils derived from Pikes Peak granite. Blue grama grass – the larval food plant – and prairie gayfeather – the primary nectar plant – are two necessary components of the ground cover. Small clumps of blue grama occur within the warm, open slopes inhabited by skippers, while prairie gayfeather occurs throughout the ponderosa pine woodlands. Skippers are very uncommon in pine woodlands with a tall shrub understory (Keenan et al. 1986) or where young conifers dominate the understory (ERT 1986).

The prairie gayfeather apparently requires openings from single event disturbances such as logging or fire-created openings, but does not tolerate continued disturbance. The skipper apparently does not colonize fire-created openings for at least several years after disturbance and regeneration. Recently burned or logged areas presented low numbers of Pawnee montane skippers (Opler 1986).

The vegetative community apparently preferred by the skipper is a northern-most extension of the ponderosa pine/blue grama grass habitat type documented from southern Colorado and northern New Mexico. However, the preferred nectar plant of the skipper, the prairie gayfeather, does not occur in similar habitats to the south. The northeastern limit of the ponderosa pine/blue grama grass community overlapping with the southwestern limit of the prairie gayfeather may contribute to the maintenance of the species in this limited area. Its existence in this limited area accentuates the ecological precariousness of the skipper.

Ute ladies' tresses. [Federal Threatened] Ute ladies' tresses is a perennial herb with a flowering stem, 2-5 decimeters tall, arising from a basal rosette of grass-like leaves. The flowers are ivory-colored, arranged in a spike at the top of the stem. These plants bloom mainly from late July through August. This species is known only from sporadic occurrences in lower-elevation wet meadow habitats in the interior western United States. The species was Federally listed as threatened in 1992 when it was only known from Colorado, Utah, and Nevada. Since that time, it has been found in Wyoming, Montana, Nebraska, and Idaho. Currently, the largest documented population—with about 5,500 plants—is in Colorado. Several historic populations in Utah and Colorado are presumed extirpated. Ute ladies' tresses occurs on moist to very wet meadows, along streams, or in abandoned stream meanders (oxbows) that still retain ample ground water. They also occur near springs, seeps, and lakeshores. They occur at elevations between 4,500 and 6,800 feet. The riparian habitat on which this species depends has been drastically modified by urbanization and stream channelization for agriculture and development. Most surviving populations are small and appear to be relicts.

3.5.2 Federally-Listed, Proposed, and Candidate Species that Occur in the Vicinity of Denver Water Properties

On 21 January 2003, the Service provided a list (below) of federal threatened, endangered, candidate, and proposed species known to occur in the region and on sites adjacent to Denver Water properties covered by the HCP (Linder pers. comm. 2003). Federally listed species known to occur or likely to occur on Denver Water Properties are discussed in section 3.5.1. However it should be noted that the HCP and ITP cover only Preble's, and do not cover the other federally listed and candidate species listed below.

Black-tailed prairie dog	(<i>Cynomys ludovicianus</i>)
Canada lynx	(<i>Lynx canadensis</i>)
Mexican spotted owl	(<i>Strix occidentalis lucida</i>)
Mountain plover	(<i>Charadrius montana</i>)
Greenback cutthroat trout	(<i>Onchorhynchus clarki stomias</i>)
Colorado butterfly plant	(<i>Gaura neomexicana coloradensis</i>)

Should any of these species be identified on Denver Water properties, and if incidental take was anticipated, additional consultation and permitting with the Service will be required. Table 4 provides brief habitat descriptions of each of these species, while more detailed discussion of range and habitat are provided in Appendix B.

3.5.3 Colorado Threatened, Endangered, and Special Concern Species

In addition to the federally listed species considered, the Colorado Natural Heritage Program listed the river otter (*Lontra canadensis*) and a number of fish and one amphibian as state threatened, endangered, or special concern species which may occur within the planning area covered by the HCP. Brief range and habitat descriptions for the species monitored by the Colorado Natural Heritage Program that have the potential, based on geographic and elevational distribution, to occur within the HCP area are presented in Appendix B. Table 5 provides a synopsis of taxonomic and habitat information, and state and federal status for each species considered.

3.5.4 Species Tracked by the Colorado Natural Heritage Program

The Colorado Natural Heritage Program tracks and ranks Colorado's species and habitats, and provides information and expertise on these resources to promote the conservation of Colorado's valuable biological resources. Other plant and wildlife species, monitored by The Colorado Natural Heritage Program (but not listed as endangered, threatened, or species of special concern), and which may occur within the HCP area include several species of butterflies, including the Arogos and Ottoe Skippers (*Atrytone arogos* and *Hesperia ottoe*, respectively) and Hop's Azure (*Celastrina humulus*), and a number of vascular plants, including Bell's twinpod (*Physaria bellii*), rattlesnake fern (*Botrypus virginianus*) and the wood lily (*Lilium philadelphicum*) (CNHP 2003). While these species are not described in detail in this EA, a list is provided at the end of Appendix C.

3.6 CULTURAL RESOURCES

The study area for the Denver Water properties addressed in this EA, related to cultural resources falls on the transition between the Colorado Plains Prehistoric Context (Eighmy 1984), and the Colorado Mountains Prehistoric Context (Guthrie et al. 1984), as defined by the Office of Archaeology and Historic Preservation Resource Protection Planning Process (RP3). This area is termed the Plains foothills subarea and the Mountains front range subarea. A third, updated context for the prehistoric resources within the Platte River basin (CCPA 1999) is also applicable. Historic resources in the study area are characterized in the Colorado Plains Historic Context (Mehls 1984a) and the Colorado Mountains Historic Context (Mehls 1984b). The archaeological resources in the area that date to the historic period can be assessed in the Colorado Historical Archaeology Context (Buckles and Buckles 1984).

TABLE 4. BRIEF HABITAT DESCRIPTIONS OF FEDERALLY-LISTED, PROPOSED, AND CANDIDATE SPECIES KNOWN TO OCCUR IN THE REGION

COMMON NAME	SCIENTIFIC NAME	HABITAT REQUIREMENTS	FEDERAL STATUS	STATE STATUS	POTENTIALLY IN COUNTY ¹
MAMMALS					
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	Dry, flat, open grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle. Occurs in open vacant lots at town edges in some areas. Young are born in underground burrows.	C	SC	B, D, J
Canada lynx	<i>Lynx canadensis</i>	Generally occurs in boreal and montane regions dominated by coniferous or mixed forest with thick undergrowth, but also sometimes enters open forest, rocky areas, and tundra to forage for abundant prey. When inactive or birthing, occupies den typically in hollow tree, under stump, or in thick brush. Den sites tend to be in mature or old growth stands with a high density of logs (Koehler 1990, Koehler and Brittell 1990).	T	E	—
BIRDS					
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Most common where unlogged closed canopy forests occur in steep canyons; uneven-aged stands with high basal area and many snags and downed logs are most favorable. In Arizona, occurs primarily in mixed-conifer, pine-oak, and evergreen oak forests; also occurs in ponderosa pine forest and rocky canyonlands (Ganey and Balda 1989). Nests on broken tree top, cliff ledge, in natural tree cavity, or in tree on stick platform, often the abandoned nest of hawk or mammal; sometimes in cave. In Utah and Colorado, most nests are in caves or on cliff ledges in steep-walled canyons; elsewhere, nests apparently most often in trees, especially Douglas-fir (USFWS 1995, Seamans and Gutierrez 1995). Exhibits high level of nest site fidelity.	T	T	D
Mountain plover	<i>Charadrius montana</i>	Nests are made on high plains/shortgrass prairie and desert tablelands, commonly at prairie dog towns in some areas, such as sagebrush/blue grama habitats in central Montana. In central and southwestern Montana, southeastern Wyoming, and northeastern Colorado, nesting often occurs in shortgrass prairie with a history of heavy grazing or in low shrub semideserts. Nesting areas are characterized by very short vegetation, significant areas of bare ground (typically >30%, which may be the minimum requirement), and flat or gentle slopes (<5%) (Graul 1975, Graul and Webster 1976, Knowles et al. 1982, Olson 1984, Olson and Edge 1985, Olson-Edge and Edge 1987, Knopf and Miller 1994, Knopf 1996). This bird generally avoids moist soils. Preferred non-breeding habitat consists of short-grass plains and fields, plowed fields and sandy deserts (AOU 1983), and commercial sod farms (New Mexico, Knopf 1996).	P	SC	B,D,J
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co. --- = no designated status DM=delisted, monitored E=endangered SC=State Special Concern (Not a statutory category) T=Threatened					
General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; CNHP 2003					

COMMON NAME	SCIENTIFIC NAME	HABITAT REQUIREMENTS	FEDERAL STATUS	STATE STATUS	POTENTIALLY IN COUNTY ¹
FISH					
Greenback cutthroat trout	<i>Onchorhynchus clarki stomias</i>	Clear, swift-flowing mountain streams with cover such as overhanging banks and vegetation; juveniles tend to shelter in shallow backwaters; also in lakes (Matthews and Moseley 1990). Spawns in riffles.	T	E	B
INSECTS					
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	Known only from Pikes Peak Granite Formation in S. Platte River drainage in Colorado. Total range of species is ~23mi long, 5mi wide, extending from just N of Pine, CO through Deckers, to Jefferson-Douglas-Teller-Park county line area. Inhabits dry, open Ponderosa pine with sparse understory at elevations of 6,000-7500ft. Blue grama and prairie gayfeather are key habitat components.	T	E	J
VASCULAR PLANTS					
Colorado butterfly plant	<i>Gaura neomexicana coloradensis</i>	Early successional species adapted to periodically disturbed, subirrigated channels with short vegetative cover, at elevations of 5000-6400ft.	T	E	D
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co. --- = no designated status DM=delisted, monitored E=endangered SC=State Special Concern (Not a statutory category) T=Threatened General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; CNHP 2003					

TABLE 5. STATE LISTED SPECIES WITH THE POTENTIAL TO OCCUR ON DENVER WATER PROPERTIES

COMMON NAME	SCIENTIFIC NAME	HABITAT REQUIREMENTS	FEDERAL STATUS	STATE STATUS	POTENTIALLY IN COUNTY ¹
MAMMALS					
River otter	<i>Lontra canadensis</i>	Streams, lakes, ponds, swamps, marshes, estuaries (in some areas), beaver flowages, exposed outer coast (Pacific Northwest, Alaska). When inactive, occupies hollow log, space under roots, log, or overhang, abandoned beaver lodge, dense thicket near water, or burrow of other animal; such sites also are used for rearing young. Highly associated with beaver on Mount Desert Island, Maine (Dubuc et al. 1990). Uses traditional haul-out sites along the banks of aquatic habitats. May travel long distances overland, particularly in snow.	—	E	B,J
BIRDS					
American peregrine falcon	<i>Falco peregrinus anatum</i>	Found in various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (AOU 1983). In the non-breeding season, this species occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports.	DM	SC	B,D,J
Barrow's goldeneye	<i>Bucephalea islandica</i>	Winters on lakes, rivers, estuaries, and bays. Usually nests near lake or pond surrounded by dense vegetation. May nest in wooded or open country. Usually nests in a natural tree cavity, abandoned woodpecker hole, rock cavity, stream bank. Often nests in same area in successive years.	—	SC	B,D,J
Ferruginous hawk	<i>Buteo regalis</i>	Open country, primarily prairies, plains and badlands; sagebrush, saltbush-greasewood shrubland, periphery of pinyon-juniper and other woodland, desert. In the southern Great Plains, common at black-tailed prairie dog colonies in winter (Schmutz and Fyfe 1987). Nests in tall trees or willows along streams or on steep slopes, in junipers (Utah), on cliff ledges, river-cut banks, hillsides, on power line towers, sometimes on sloped ground on the plains or on mounds in open desert. Generally avoids areas of intensive agriculture or human activity. High elevations, forest interiors, narrow canyons, and cliff areas are also avoided (Janes 1985, Palmer 1988, Black 1992).	—	SC	B,D,J
Greater sandhill crane	<i>Grus canadensis</i>	Breeding habitat includes open grasslands, marshes, marshy edges of lakes and ponds, river banks (Terres 1980). Nests on the ground or in shallow water on open tundra, large marshes, bogs, fens, or wet forest meadows. Exhibits high fidelity to breeding territories (see Littlefield 1995). When not breeding, roosts at night along river channels, on alluvial islands of braided rivers, or natural basin wetlands. A communal roost site consisting of an open expanse of shallow water is a key feature of wintering habitat. Along the North Platte River in spring, roosts are generally in shallow water (< 20 cm), 11-50 m from the nearest visual obstruction, and away from paved or gravel roads, single dwellings, and bridges (Norling et al. 1992). See also Folk and Tacha (1990) for a description of roost site characteristics in the North Platte River Valley. Cranes migrating in spring through interior Alaska often roost on river overflow ice of the Tanana River or on the ice of ponds and lakes (Johnsgard 1991). Often feeds and rests in fields and agricultural lands.	—	SC	B,D,J
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co. --- = no designated status DM=delisted, monitored E=endangered SC=State Special Concern (Not a statutory category) T=Threatened General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; CNHP 2003					

COMMON NAME	SCIENTIFIC NAME	HABITAT REQUIREMENTS	FEDERAL STATUS	STATE STATUS	POTENTIALLY IN COUNTY ¹
Long-billed curlew	<i>Numenius americanus</i>	Breeding habitat is prairies and grassy meadows, generally near water (AOU 1983). Nests in dry prairies and moist meadows. Nests on ground usually in flat area with short grass, sometimes on more irregular terrain, often near rock or other conspicuous object. In Wyoming, often nests near manure pile if available (Cochran and Anderson 1987). In northern Utah, nests tended to be in small patches of short vegetation near barren ground (Paton and Dalton 1994). Non-breeding habitat used during migration and in winter includes beaches and mudflats (AOU 1983).	—	SC	B,D,J
Plains sharp-tailed grouse	<i>Tympanuchus phasianellus jamesii</i>	Requires a mosaic of dense grass and shrubs with rich forb and insect foods during nesting and brood-rearing. During winter often relies on riparian areas and other sites that support deciduous trees and shrubs for feeding, roosting, and escape cover; also utilizes non-native cultivated grains and hedgerow species. Natural succession of grasslands and shrublands to forests, accelerated or expanded geographically by artificial fire regimes, have influenced habitat quality and populations in several regions. Habitat and distribution is constrained in regions where fire suppression has reduced early and mid-successional vegetation communities.	—	E	J
Western burrowing owl	<i>Athene cunicularia</i>	Optimum habitat typified by short vegetation and presence of fresh small mammal burrows particularly black-tailed prairie dog. (Zarn 1974). Found in open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation (e.g., campuses, airports, golf courses, perimeter of agricultural fields, banks of irrigation canals).	—	T	B,D,J
White pelican	<i>Pelecanus erythrorhynchos</i>	Habitats utilized include rivers, lakes, reservoirs, estuaries, bays, marshes; sometimes inshore marine habitats. Rests on islands and peninsulas. Nests usually on islands or peninsulas in brackish or freshwater lakes, isolated from mammalian predators. Nests on the ground in a slight depression or on a mound of earth and debris 24-36 inches across, 15-20 inches high (Terres 1980). Usually on low flat, or gently sloping terrain. May use dredge spoil or natural islands. Usually nests in open area, but often near vegetation, driftwood, or large rocks (Spendelov and Patton 1988).	—	SC	B,D,J
AMPHIBIANS					
Northern leopard frog	<i>Rana pipiens</i>	Springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually permanent water with rooted aquatic vegetation. In summer, commonly inhabits wet meadows and fields. Takes cover underwater, in damp niches, or in caves when inactive. Usually overwinters underwater.	—	SC	B,D,J
FISH					
Common shiner	<i>Luxilus cornutus</i>	Creeks and small to medium rivers with clear cool weedless water, moderate to swift current, gravel to rubble bottom, and alternating pools and riffles (usually avoids riffles). Also lakes and reservoirs, especially in north. Turbid waters in Great Plains.	—	T	B,D,J
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co. --- = no designated status DM=delisted, monitored E=endangered SC=State Special Concern (Not a statutory category) T=Threatened General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; CNHP 2003					

COMMON NAME	SCIENTIFIC NAME	HABITAT REQUIREMENTS	FEDERAL STATUS	STATE STATUS	POTENTIALLY IN COUNTY ¹
Iowa darter	<i>Etheostoma exile</i>	Clear sluggish vegetated headwaters, creeks, and small to medium rivers; weedy portions of glacial lakes, marshes, ponds; over substrates of sand, peat, and/or organic debris. Occurs in deeper lake waters and in stream pools when not breeding.	—	SC	B,D,J
Lake chub	<i>Couesius plumbeus</i>	Varied habitats, standing or flowing water, large or small bodies of water; most common in gravel-bottomed pools and runs of streams and along rocky lake margins (Page and Burr 1991). More common in lakes in south, in rivers in north (but in lakes if available). Often in shallows but may move into deeper parts of lakes in summer. Spawns in river shallows, along rocky shores, in shoals of lakes. May migrate up to 1.6 km (1mi) upstream from lakes to spawning areas (Becker 1983).	—	E	B,D,J
Northern redbelly dace	<i>Phoxinus eos</i>	Boggy lakes, ponds; beaver ponds; pools of headwaters and creeks; often in tea colored water over fine detritus or silt; usually near vegetation (Lee et al. 1980, Page and Burr 1991). Spawns among mats of filamentous algae or aquatic plants (Faber 1985).	—	E	B,D,J
Plains minnow	<i>Hybognathus placitus</i>	Occupies silt-laden rivers, slower water, and side pools of silty streams; large streams and rivers over beds of sand and silt with some current (Lehtinen and Layzer 1988). Clear to highly turbid rivers and creeks with sandy bottoms, high levels of dissolved solids, and slight to moderate erratic flows (Sublette et al. 1990) typical. Eggs probably scattered over silt-bottomed backwaters. Considered possibly extirpated in Colorado by some experts (NatureServe 2002).	—	E	B,D,J
Plains topminnow	<i>Fundulus sciadicus</i>	Clear, sandy to rocky, spring-fed streams, creeks, and small to medium rivers with moderate to rapid current; in quiet pools and backwaters and overflow pools of larger streams in Missouri; usually near vegetation. Eggs are deposited on aquatic plants or algae.	—	SC	B,D,J
Suckermouth minnow	<i>Phenacobius mirabilis</i>	Plains species tolerant of moderate turbidity; runs and riffles of creeks and small to medium (sometimes large) rivers with substrates ranging from sand and gravel to large boulders (Sublette et al. 1990, Page and Burr 1991). Presumably spawns over gravelly riffles.	—	E	B,D,J
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co. --- = no designated status DM=delisted, monitored E=endangered SC=State Special Concern (Not a statutory category) T=Threatened General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; CNHP 2003					

Cultural resource file searches were completed at the Colorado Historical Society, Office of Archaeology and Historic Preservation. General results for all properties included in the study area were obtained. Specific attention was given to activities that are foreseeable at this time, in which case information on all surveys and sites within 100 meters of the proposed activities was gathered. Results are discussed below, organized by conservation zone and foreseeable activity.

3.6.1 North Conservation Zone

The North Conservation Zone includes the South Boulder Creek Properties below Gross Reservoir, the South Boulder Diversion Canal, and the Ralston Creek/Long Lake Feeder Ditch above Ralston Reservoir (**Figure 4**). Maps of these areas with cultural resources plotted were reviewed by the Office of Archaeology and Historic Preservation for this EA.

The area from Gross Reservoir and Eldorado Springs south to Ralston Reservoir has been subject to several cultural resource surveys. The most comprehensive investigations in the general area have taken place east of the South Boulder Diversion Canal on the Department of Energy, Rocky Flats Environmental Technology Site. Here, sampling and intensive surveys have recorded and rerecorded numerous prehistoric and historic archaeological sites. More specific to the Denver Water properties include an inventory of the Ranson/Edwards Homestead Open Space Park in Jefferson County and particularly a cultural resource survey of the Doudy Draw Drainage and Eldorado Mountain for the City of Boulder Open Space. In addition, the town of Eldorado Springs itself includes several historic sites.

Two foreseeable activities within this zone include conversion of the South Boulder Diversion Canal and associated siphons to a buried pipeline along its entire length, and conversion of the Long Lake Feeder Ditch, upstream of Ralston Reservoir, to a buried pipeline.

The historic South Boulder Diversion Canal, which is the subject of the first activity, is recorded as 5JF516/5BL2375. It was determined a resource officially eligible to the NRHP 1988, however some segments are noncontributing elements. The segments where the South Boulder Diversion Canal crosses Spring Brook, Doudy Draw, and Coal Creek have not been evaluated. The Upper Church (5JF512.1) and McKay (5JF513.1) ditches feed into the South Boulder Diversion Channel from the east, approximately two miles south of the Jefferson/Boulder County line. Both of these historic ditches have been officially determined not eligible for the NRHP. In Boulder County, several historic archaeological sites have been recorded directly adjacent to the South Boulder Diversion Canal. These include: Craggs Mountain Resort (5BL2376), the Red Rock Cola Cabin (5BL5061), the Beasley Cabin (5BL4113), and a historic isolated sandstone wall (5BL4117). Two resources have been recorded near the crossing of Doudy Draw and the South Boulder Diversion Channel. These include the Forest Park Townsite (5BL4111) and one historic isolated find (5BL4098). Both of the latter are more than 300 meters north of the crossing as it appears on the Eldorado Springs quadrangle. None of these resources have been determined officially eligible for the NRHP, although the Beasley and Red Rock Cola cabins need more data before an assessment can be made. No cultural resources have been recorded near the Coal Creek crossing.

The Long Lake Feeder Ditch (**Figure 14**) has not been recorded as a cultural resource. Only two sites are recorded adjacent to the ditch. Both sites are prehistoric archaeological camps that need further data before an NRHP eligibility assessment can be made. The Ralston Buttes/Golden Properties (5JF1265) is a rockshelter, while Site 5JF284 is an open camp. In addition, other sites are plotted near the ditch to the west and north, along Ralston Reservoir.

3.6.2 South Conservation Zone

The South Conservation Zone includes the Kassler and Waterton Canyon Properties, Foothills Water Treatment Plant Property, Conduit 26 Properties, and Strontia Springs Reservoir (**Figure 5**). Maps of these areas with cultural resources plotted were reviewed by the Office of Archaeology and Historic Preservation for this EA.

The area of Chatfield Reservoir has been investigated since as early as the 1960s by the University of Denver, while more recent cultural resource surveys in this zone have focused primarily on linear development projects for fiber optic, telephone lines, and highway projects. These endeavors have recorded several prehistoric and historic resources. The highest recorded site density within the South Conservation Zone is in an area from the South Platte River Canyon south along the Hogback. The most focused and comprehensive studies have taken place here, and in and around Roxborough State Park.

The Roxborough State Park Archaeological District (5DA343), which includes state park lands, is located just south of the Foothills Water Treatment Plant Property. This district, which consists of numerous archaeological sites located within an approximate 6-square-mile area, was listed in the NRHP in 1983. Since then, various surveys, research projects, and site specific data recovery efforts have been undertaken within the boundaries of the district. Distinctive characteristics of the district include an abundance of overhangs, rockshelters, windbreaks, and natural alcoves, as well as toolstone outcrops, utilized by prehistoric people.

Foreseeable activities within this zone include construction of Conduit W from the Foothills Treatment Plant through Kassler paralleling existing Conduits 133 and 20. A second set of activities is foreseeable within the Foothills property, including construction of a new sewer line across Willow Creek and construction of a new treated water distribution line parallel to Conduit 27.

One portion of Conduit W would parallel existing Conduit 133, which runs from approximately the Foothills Treatment Plant to the High Line Canal at the South Platte River and the Douglas and Jefferson County line. At its southern end, the conduit lies within the boundaries of the previously discussed Roxborough State Park Archaeological District. In addition, one prehistoric archaeological camp (5DA121) is located adjacent to the conduit north of the treatment plant. It has not been assessed for the NRHP.

Sites near existing Conduit 20 are clustered just north of the High Line Canal and county line and include three prehistoric camps (5JF23, 5JF132, and 5JF140), as well as one prehistoric lithic scatter (5JF131), none of which have been assessed for NRHP eligibility. Another

prehistoric open camp (5JF135) is recorded to the north between Fairview Reservoir and Chatfield Reservoir, and it has been assessed as not eligible for the NRHP by field recorders.

For the foreseeable activities within the Foothills property, there are several sites recorded near the Aurora Rampart Reservoir, in the vicinity of Willow Creek and existing Conduit 27, although their exact locations in relation to the foreseeable activities are unknown. The proximity to the Roxborough State Park Archaeological District indicates that there is a high density of important archaeological sites in this area.

3.6.3 High Line Canal Conservation Zone

The High Line Canal Conservation Zone includes a segment of the Canal extending roughly from the Kassler and Waterton Canyon Properties east and north to Highway 85 (see **Figure 6**). A map of this area with cultural resources plotted was reviewed by the Office of Archaeology and Historic Preservation for this EA.

The High Line Canal (5DA600) is a historic resource that was officially determined eligible for inclusion in the NRHP in 1981 (**Figure 17**). It is an extensive irrigation feature, stretching through four counties, that was built around 1865 to carry water into the then-developing City of Denver. This portion of the High Line Canal has been the subject of several cultural resource surveys, primarily related to Chatfield Reservoir, construction of C-470 by the Colorado Department of Transportation, and the development of Highlands Ranch; the latter in particular recorded over 100 prehistoric sites.



FIGURE 17. HIGH LINE CANAL

Foreseeable activities within this zone include refinements to the High Line Canal to decrease seepage (i.e., lining the bed of the canal). Besides the canal, other resources located along the High Line Canal include two open lithic scatters (5DA103 and 5DA104), both of which have been assessed as not eligible for the NRHP by field recorders. A third site (5DA99) is an open camp with numerous types of artifacts. It also was assessed as not eligible for the NRHP by field recorders. All three of these sites are located near Plum Creek.

The most significant recorded site in proximity to this segment of the High Line Canal is the Lamb Spring Site (5DA83), which was listed in the NRHP in 1997. This archaeological and paleontological resource has been investigated since the 1960s by numerous academic institutions and museums who have performed not only survey and surface collection, but also excavation and research. The site is characterized as a bison kill site with two bone beds and an extensive assemblage of projectile points and other tools that represent prehistoric periods ranging from as long ago as 12,000 years to as recently as AD 1,000. The site also contains numerous fossils.

3.6.4 Upper South Platte Properties

The Upper South Platte Properties include Cheesman Reservoir and the Upper South Platte Lands downstream to approximately Strontia Springs Reservoir (**Figure 7**). There are no foreseeable activities within these property boundaries at this time. Operations and maintenance activities would continue. Maps of these areas with cultural resources plotted were reviewed by the Office of Archaeology and Historic Preservation for this EA.

Public and private organizations have conducted numerous surveys along the upper South Platte. Researchers have cataloged numerous sites, some eligible for the NRHP, others ineligible, and still others in need of more data before a decision on eligibility can be made. The Cheesman Reservoir area properties include Cheesman Lake, Cheesman Mountain, and a portion of the South Platte and major tributaries, including Turkey Creek and Wigwam Creek. Various structures at Cheesman Lake may be historic, yet no official determination has been made regarding eligibility. These include the Wigwam Mill Set (5JF331), Watchman's House (5JF354), and Cheesman Dam (5DA345). Several archaeological sites have been recorded in the vicinity of Cheesman Dam, where the South Platte River forms the lake just south of the mountain. One large site is located along Wigwam Creek just west of Cheesman Mountain, while the preponderance of other recorded sites in the area lie between Turkey Creek and Cheesman Mountain, along small drainages such as Flickenstein Gulch, Sand Draw, and Northrup Gulch.

The following resources are located within or near the Upper South Platte Properties: the NRHP-listed North Fork Historic District (5JF189), which roughly extends from South Platte to Pine along the North Fork of the South Platte River; the NRHP-eligible Denver and Rio Grande Railroad (5JF363); and the NRHP-eligible South Platte Stage Road (5DA626). The entire corridor of the North Fork of the South Platte has been intensively studied and numerous archaeological sites are recorded along the river, and also on the directly adjacent uplands. Open sites as well as rock shelters are prevalent.

A stretch of the South Platte that encompasses the Upper South Platte Properties lies just north of Cheesman Reservoir and extends from Deckers to just north of Highway 67. As would be anticipated, several archaeological sites have been recorded on both sides of the river, with site types ranging from lithic scatters to rock shelters. An example of the diversity of archaeological site types in the area is illustrated by the excavations at Dancing Pants shelter. A rock shelter occupied between approximately 600 BC and AD 1300, this site displays an interesting technique of utilizing locally available rock slabs and natural boulders to form a wall within the shelter. This portion of the South Platte clearly was utilized during prehistoric and historic times for resource exploitation, as well as habitation.

An archaeological survey of a portion of the South Platte River, between its confluence with the North Fork upstream to Strontia Springs Reservoir, has been completed to assess the impacts of the proposed Foothills project by Denver Water. Identified resources directly adjacent to the project area include nine sites, all of historic age. Six of these sites have been recommended as not eligible for the NRHP by the recorders, although none have been formally reviewed by the SHPO. They include a structure foundation, communication line, windmill, homestead, railroad grade, and bridge. Another resource, a historically utilized spring, has no recommendation as to eligibility. The Denver, South Park and Pacific Railroad line exists in the area as a historic archaeological railroad grade that is recommended as eligible for the NRHP by the recorders. Finally, the Deansbury Bridge is officially eligible for the NRHP and has been the subject of Historic American Engineering Record documentation.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This section describes the environmental consequences of the No-Action and the Preferred Alternatives. The methods for assessing environmental consequences are also discussed. NEPA requires consideration of context, intensity, and duration of impacts, cumulative impacts, and measures to mitigate impacts. Subsequent sections in this chapter are organized by impact topic, first for the No-Action Alternative, then for the Denver Water Preferred Alternative.

4.2 METHODS FOR ASSESSING IMPACTS

Overall, impact analyses and conclusions were based on the review of existing literature; information provided by Denver Water staff and wildlife consultants; and professional judgments and insights of other agencies and officials (e.g., the Service, Colorado SHPO). Definitions used to evaluate the context, intensity, duration, and cumulative nature of impacts associated with the EA alternatives are discussed below.

Context is the setting within which an impact is analyzed, such as the affected region, society as a whole, the affected interests, and/or a locality. In this EA, intensity of impacts are evaluated within a local (i.e. the planning area covered by the HCP) context, while the intensity of cumulative impacts are evaluated in a regional (i.e., Colorado Front Range) context.

For this analysis, *impact intensity* or severity is defined for each impact topic as follows:

Denver Water Operations

- Negligible – the impact on Denver Water operations is at the lowest level of detection – barely perceptible and not measurable
- Minor – the impact on Denver Water operations is measurable but localized and does not affect the level of service.
- Moderate – the impact on Denver Water operations is measurable and extends beyond the immediate management action area, but still does not affect the level of service.
- Major – the impact causes Denver Water operations to deviate markedly from current levels, and affects the level of service.

Wetland, Riparian, and Aquatic Resources

- Negligible – actions of the alternative could affect wetland, riparian, and aquatic resources but the change would be so small that it would not be measurable or have any perceptible consequences.
- Minor – actions of the alternative could affect wetland, riparian, and aquatic resources but the change would be slight and localized with few measurable consequences (i.e., the functions of the resource would not be lost).

- Moderate – actions of the alternative could affect wetland, riparian, and aquatic resources with measurable changes (i.e., the function of the resource would be affected).
- Major – actions of the alternative would result in total loss of wetland, riparian, or aquatic resources.

Floodplains

- Negligible – an action that could alter floodplain characteristics, values, or plant communities, but the change would be so small that it would not be of any measurable or perceptible consequence.
- Minor – an action that could alter floodplain characteristics, values, or plant communities, but the change would be slight and localized with few measurable consequences.
- Moderate – an action that would result in readily apparent changes to floodplain characteristics, values, or plant communities with measurable consequences.
- Major – a severely adverse change in floodplain characteristics, values, or plant communities.

Threatened and Endangered Species and Species of Special Concern

Terminology in the Act used to assess impacts to federally listed species read as follows:

- No effect – when the alternative would not affect a federally listed, proposed, or candidate species, or its habitat
- May affect / not likely to adversely affect – effects on a federally listed, proposed, or candidate species or designated critical habitat are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or completely beneficial
- May affect / likely to adversely to affect – when an adverse effect to a federally listed, proposed, or candidate species, or designated critical habitat may occur as a direct or indirect result of proposed actions and the effect is either not discountable or completely beneficial

Consultation regarding Section 7 compliance for the HCP and ITP will be conducted prior to issuance of the ITP. The resulting biological opinion will be included as an appendix to the EA when complete.

Effect levels used to assess impacts to state listed species are:

- Negligible – actions of the alternative could affect state listed species/habitat, but the change would be so small that it would not be measurable or have any perceptible consequence
- Minor – actions of the alternative could affect state listed species/habitat, but the change would be slight and localized with few measurable consequences
- Moderate – actions of the alternative could affect state listed species/habitat, with measurable changes not localized to the management action area, but no state listed species would be markedly impacted

- Major – actions of the alternative could affect state listed species/habitat, with measurable, localized and/or non-localized changes, and one or more state listed species may be markedly impacted

Cultural Resources

In accordance with section 106 of the National Historic Preservation Act, an assessment of the effects of proposed activities on features that were determined, in consultation with the Colorado SHPO, to meet the NRHP criteria or are listed on the NRHP must be conducted. Terminology used in the National Historic Preservation Act to assess impacts to historic resources are:

- No Historic Properties Affected – if no historic properties are found or no effects on historic properties are determined, appropriate documentation must be provided to the SHPO/Tribal Historic Preservation Office and consulting parties notified for their concurrence
- No Adverse Effect – when the criteria of adverse effect are applied (36 CFR 800.5(a)), and it is determined that historic properties will not be adversely affected by the undertaking, the agency may make a finding of “no adverse effect.” This finding is submitted to the Colorado SHPO for concurrence
- Historic Properties Adversely Affected – adverse effects occur when an undertaking may directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the NRHP. Reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative should also be considered. The finding of “historic properties adversely affected” is submitted to the SHPO/Tribal Historic Preservation Office for concurrence

The *duration* of the impacts in this analysis is defined as follows:

- Short term – impacts occur only during the management activity or last for one to five years.
- Long term – impacts would occur for greater than five years.

4.3 CUMULATIVE IMPACTS

The Council of Environmental Quality regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal activities such as the issuance of an ITP. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative impacts are considered for both the No-Action and Preferred Alternatives.

Cumulative impacts were determined by combining the impacts of the Preferred Alternative with other past, present, or reasonably foreseeable future actions conducted by or to be conducted by

Denver Water and other entities within the Front Range habitat of Preble's. There are several actions that are anticipated to contribute to cumulative effects. Residential and commercial development in Boulder, Douglas, and Jefferson Counties, in response to increased population growth, would contribute to the cumulative impacts of the alternatives. By 2020, the population of Boulder County is anticipated to reach 395,646 people, a 36% increase over year 2000 populations (291,288); the population of Douglas County is anticipated to reach 361,813 people, a 106% increase over year 2000 levels (175, 766); and the population of Jefferson County is anticipated to reach 617,760 people, a 17% increase over year 2000 populations (527,056) (U.S. Census Bureau 2001, Colorado Department of Local Affairs 2001).

This development would result in direct loss of Preble's and/or its habitat, as well as have numerous indirect effects. These include: (1) increased water demand; (2) increased impervious surfaces (e.g., roofs, driveways, streets, highways, etc.), which could alter stream flows; (3) increased urban predators including skunks, raccoons, coyotes, foxes, and even domestic cats and dogs; (4) new trails and increased trail use in riparian and adjacent upland habitats; (5) increases in exotic species of plants and animals; (6) new utility lines and infrastructure to accommodate demands, including buried and aboveground conduits; (7) new transportation corridors; (8) continued agriculture practices including grazing, farming, irrigation, fertilizing, and mowing; and (9) increased demand for materials such as sand and gravel which are often mined in floodplain habitats.

Natural causes of cumulative impacts could include continued drought along the Front Range.

Implementation of HCPs under preparation for Boulder, Douglas, Jefferson, and El Paso Counties, as well as those under preparation for private land owners and developers, would also contribute to the cumulative effects considered in this EA.

4.4 ADDITIONAL MITIGATION MEASURES

4.4.1 Cultural Resources

Under the No-Action Alternative, Denver Water would likely address NHPA compliance on a project-by-project basis. Alternatively, in consultation with the Colorado Historical Society, Office of Archaeology and Historic Preservation and the Colorado SHPO, Denver Water could develop a list of the types of activities that do not have the potential to affect historic properties (i.e., those cultural resources either listed on the NRHP or eligible for listing) under either the No-Action or Preferred Alternative. Upon receipt of concurrence from the SHPO, these types of activities would be managed as Categorical Exclusions and would require only tracking by Denver Water (Green, pers. comm. 2003). A concurrence page with signatures from the SHPO, Denver Water, and the Service will be inserted into an appendix of this EA when available.

For those activities considered undertakings (i.e., those activities that do have the potential to affect historic properties), regulations and guidelines implementing section 106 of the National Historic Preservation Act would be followed (Green, pers. comm. 2003). These would include conducting a records search and an on-the-ground cultural resource survey of the area of

potential effect for such activities prior to any ground disturbance. A written report would be provided to the SHPO for concurrence with findings and recommendations for eligibility of resources within the area of potential effect, and a determination of proposed effects would be made. Appropriate mitigation measures then would be developed and implemented prior to approval of the activity by the SHPO (Green pers. comm. 2003).

In addition, all employees and contractors for Denver Water should be advised of appropriate actions should cultural resources be encountered during any activity. An inadvertent discovery plan should be in place to guide coordination with appropriate agencies, should such discoveries occur (Green pers. comm. 2003). This would minimally involve work stoppage in the discovery area, and consultation by Denver Water according to 36 CFR 800.11 and, as appropriate, implementation of provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).

4.5 ENVIRONMENTAL CONSEQUENCES – ALTERNATIVE A: NO ACTION

4.5.1 Denver Water Operations

Under the No-Action Alternative, proposed activities that might result in take of Preble's, could occur but would require the Service to issue multiple ITPs under section 10(a)(1)(B) of the Act. While low effect ITPs and HCPs are expected to take 60 to 90 days to process, all other HCPs require NEPA review and approval. Preparations and negotiations for HCPs prior to public review take a minimum of 90 days, followed by a public review process that lasts a minimum of 30 to 60 days. Finally, the Service must prepare a Biological Opinion that addresses impacts to Preble's prior to issuing the ITP. In total, issuance of an individual ITP that requires an EA would require anywhere from six to nine months. Given the numerous activities necessary to operate and maintain a municipal water system that require issuance of an ITP and preparation of an HCP, this could result in delays associated with foreseeable activities of up to four to six years. This delay could interfere with the timely conduct of activities required to maintain current levels of service to the Denver Water combined service area. In addition, Denver Water would need additional staff to support the permit process. Therefore, it is anticipated that this alternative may have short-term, moderate, adverse impacts on Denver Water operations from delays and costs associated with seeking individual ITPs and developing associated HCPs. Once individual permits were secured, there would be no additional effect.

Cumulative Impacts. Cumulative effects to Denver Water operations are based on an analysis of past, present, and reasonably foreseeable future actions along the Front Range with potential effects with this alternative. Activities with which this alternative may have cumulative impacts include continued development along the Front Range and continued drought. Development would increase water demand and present new challenges for Denver Water in operating and maintaining its water system. Continued drought would also present unique challenges to Denver Water in supplying water to its existing and future customers and contract distributors. These circumstances could have short- and long-term, minor to moderate, adverse impacts on Denver Water operations.

Construction of new utility lines, including buried and above ground conduits, road construction, and increases in exotic species are also anticipated as a result of development. These activities could require Denver Water's participation in planning for new utilities and roads. Also, Denver Water would be responsible for controlling increased populations of exotic plants and animals on their properties. Denver Water's participation in planning and exotic species control would require additional staff time to coordinate, plan, and implement necessary activities, resulting in have short- and long-term, minor, adverse impacts on Denver Water operations.

Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, moderate, adverse cumulative impacts when considered with the No-Action Alternative, because of increased demand on Denver Water operations from continued development and drought along the Front Range.

Conclusion. The short-term impacts anticipated for the No-Action Alternative on Denver Water operations are moderate and adverse due to delays associated with the time required to conduct the necessary consultations and permitting. Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, moderate, adverse cumulative impacts when considered with the No-Action Alternative, because of increased demand on Denver Water operations from continued development and drought along the Front Range.

4.5.2 Wetland, Riparian, and Aquatic Resources

The No-Action Alternative would not preclude Denver Water from implementing activities necessary to operate and maintain its water system. The take of Preble's or its habitat anticipated under this alternative would affect wetland, riparian, aquatic, and upland habitat, and mitigation measures would be identified on a project-by-project basis. Therefore, the overall impacts to wetland, riparian, and aquatic resources are assessed qualitatively.

Up to 74 acres of temporary disturbance, and one acre of permanent disturbance, is anticipated under the No-Action Alternative, some of which would affect wetland, floodplain, and aquatic resources. However, up to 10 acres of permanent take could be necessary. Restoration would begin immediately following each activity that resulted in temporary disturbances, and Best Management Practices would be used to avoid, minimize, and mitigate impacts to these resources. However, some impacts would be covered under the 4(d) rule until 22 May 2004 and would not require avoidance, minimization, and mitigation measures (see Section 1.4.1, Preble's Meadow Jumping Mouse Listing History and Status). It is also unlikely that conservation easements would be set aside to mitigate activities that individually may only result in a few acres of temporary disturbance to Preble's or its habitat, including wetland and riparian resources (e.g., foreseeable activities involving the Kassler and Waterton Canyon property). In addition, under the No-Action Alternative, Denver Water employees system-wide would not be educated on efforts that should be implemented for any activity with the potential to impact Preble's or its habitat, including wetland and riparian resources; only individuals involved in the specific activities that require an ITP would receive this information. Under the No-Action Alternative, monitoring and reporting requirements may be less intensive for the smaller acreages of Preble's habitat that would be covered by the individual ITPs. Therefore, short- and long-term, minor to moderate, adverse impacts to wetland, riparian, and aquatic resources would be anticipated from

the temporary disturbances, while long-term, minor to moderate, adverse impacts would result from the permanent disturbance.

Cumulative Impacts. Cumulative effects to wetland, riparian, and aquatic resources are based on an analysis of past, present, and reasonably foreseeable future actions along the Front Range with potential effects of this alternative. Activities that may have cumulative effects include continued development along the Front Range, continued drought, and implementation of Preble's HCPs currently being developed by Boulder, Douglas, Jefferson, and El Paso Counties, as well as by private land owners. Increased impervious surfaces, new trails and increased trail use in riparian habitat, and increases in exotic species of plants as a result of development could affect the distribution of wetland and riparian vegetation, and habitat quality. New utility lines and transportation corridors, additional agricultural practices, and increased demand for sand and gravel as a result of development could disturb wetland, riparian, and aquatic resources, resulting in short- and long-term, minor, adverse impacts on wetland, riparian, and aquatic resources.

Continued drought could affect stream flows, which in turn could affect the distribution and health of wetland, riparian, and aquatic habitat. Continued drought along the Front Range is anticipated to result in short- and long-term, minor, adverse impacts on wetland, riparian, and aquatic habitats that depend on certain flow levels in the stream systems.

The implementation of Preble's HCPs currently under preparation would allow for the take of additional Preble's habitat, which could include wetland and riparian areas. It is currently unknown how much take would be authorized under these HCPs, and it is difficult to estimate what the short-term impacts would be on wetland, riparian, and aquatic resources. However, the long-term goals of the HCPs are to protect habitat for Preble's while allowing the counties and private land owners to conduct otherwise legal activities that result in incidental take. Because these HCPs span more than five counties along the Front Range, this could be considered a regional conservation effort that would also protect wetlands, riparian areas, and aquatic resources. Therefore, short-term impacts would likely be adverse, while long-term, minor, beneficial effects to wetland, riparian, and aquatic resources would be anticipated.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, adverse cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to wetland, riparian, and aquatic resources associated with development, as well as protection of these resources within a regional conservation context.

Conclusion. Short- and long-term, minor to moderate, adverse impacts to wetland, riparian, and aquatic resources are anticipated from the temporary disturbances under Alternative A, while long-term, minor, adverse impacts would occur from the permanent disturbance. Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, adverse, cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to wetland, riparian, and aquatic resources associated with development, as well as protection of these resources within a regional conservation context.

4.5.3 Floodplains

Up to 74 acres of temporary disturbance, and one-acre of permanent disturbance, are anticipated from the No-Action Alternative, more of which may occur in upland floodplain plant communities than in wetland and riparian areas (i.e., the burial of the South Boulder Canal siphons across Doudy Draw and Coal Creek would likely disturb more vegetation of upper floodplain terraces than wetland and riparian areas, which are generally restricted to the stream corridor, because the project would span the entire floodplain). Restoration would begin immediately following each activity that resulted in temporary disturbances, and Best Management Practices would be used to avoid, minimize, and mitigate impacts. However, some impacts would be covered under the 4(d) rule until 22 May 2004 and would not require avoidance, minimization, and mitigation measures. It is also unlikely that conservation easements would be set aside to offset activities that individually may only result in limited, temporary disturbance to Preble's or its habitat, including upland floodplain plant communities (e.g., foreseeable activities involving the Kassler and Waterton Canyon property). In addition, under the No-Action Alternative, Denver Water employees system-wide would not be educated on efforts that should be implemented for any activity with the potential to impact Preble's or its habitat, including upland floodplain vegetation; only individuals involved in the specific activities that require an ITP would receive this information. Under this alternative, monitoring and reporting requirements may be less intensive for the smaller acreages of Preble's habitat that would be covered by the individual ITPs. Therefore, short- and long-term, moderate, adverse impacts to upland floodplain plant communities are anticipated from the temporary disturbances, while long-term, minor, adverse impacts would occur from the permanent disturbance.

Although this discussion focuses on upland floodplain plant communities, consideration was also given to the physical characteristics and values of floodplains. None of the activities covered by individual ITPs and HCPs, or the 4(d) rule, under the No-Action Alternative are anticipated to affect the physical characteristics or values of floodplains.

Cumulative Impacts. Cumulative effects to floodplains are based on an analysis of past, present, and reasonably foreseeable future actions along the Front Range with potential effects of this alternative. Activities that may have cumulative effects include continued development along the Front Range, continued drought, and implementation of Preble's HCPs currently being developed by Boulder, Douglas, Jefferson, and El Paso Counties, as well as by private land owners. Increased impervious surfaces, new trails and increased trail use in riparian habitat, and increases in exotic species of plants as a result of development could affect the distribution of upland floodplain plant communities. New utility lines and transportation corridors, continued agricultural practices, and increased demand for sand and gravel as a result of development could also affect the physical characteristics of floodplains resulting in short- and long-term, minor, adverse impacts on floodplains.

Continued drought could affect stream flows, which in turn could affect floodplain development and the health of upland floodplain plant communities. Continued drought along the Front Range is anticipated to result in short- and long-term, negligible to minor, adverse impacts on floodplains.

The implementation of Preble's HCPs currently under preparation would allow for the take of additional Preble's habitat, which could include upland floodplain plant communities. It is currently unknown how much take would be authorized under these HCPs, and it is difficult to estimate the short-term impacts on floodplain vegetation. However, the long-term goals of the HCPs are to protect habitat for Preble's while allowing the counties and private land owners to conduct otherwise legal activities that result in incidental take. This could be considered a regional conservation effort that would also protect upland floodplain vegetation. Therefore, short-term impacts would likely be adverse, while long-term, minor, beneficial effects to floodplains would be anticipated.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, adverse cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to floodplains associated with development, as well as protection of these resources within a regional conservation context.

Conclusion. Short- and long-term, moderate, adverse impacts to upland floodplain habitat are anticipated from temporary disturbances under the No-Action Alternative, while long-term, minor, adverse impacts would occur from the permanent disturbance. There would be no impacts to the physical characteristics or values of floodplains in the planning area covered by the HCP. Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, adverse cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to floodplains associated with development, as well as protection of these resources within a regional conservation context.

4.5.4 Threatened and Endangered Species, and Species of Special Concern

Federal

Under the No-Action Alternative, some Denver Water activities would be exempted from prohibitions in section 9 of the Act under the 4(d) rule until 22 May 2004. Other activities that might result in take of threatened or endangered species could not occur without prior section 7 consultation with the Service and the issuance of an ITP under section 10(a)(1)(B) of the Act. If take were anticipated for any federally-listed species, additional consultation and permitting would be required. A summary of the effect determinations for federally-listed, proposed, and candidate species is provided in Table 6, while detailed determinations are discussed below.

TABLE 6. SUMMARY OF DETERMINATIONS OF EFFECT FOR FEDERALLY-LISTED, PROPOSED, AND CANDIDATE SPECIES

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	POTENTIALLY IN COUNTY ¹	EFFECT DETERMINATION
MAMMALS					
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	C	SC	B, D, J	No Effect
Canada lynx	<i>Lynx canadensis</i>	T	E	—	No Effect
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T	T	B,D,J	May affect / Likely to adversely affect
BIRDS					
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T	D,J	No Effect
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T	T	D	No Effect
Mountain plover	<i>Charadrius montana</i>	P	SC	B,D,J	No Effect
FISH					
Greenback cutthroat trout	<i>Onchorhynchus clarki stomias</i>	T	E	B	No Effect
INSECTS					
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	T	E	J	No Effect
VASCULAR PLANTS					
Colorado butterfly plant	<i>Gaura neomexicana coloradensis</i>	T	E	D	No Effect
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	T	—	B,J	No Effect
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co., --- = no designated status C = Candidate DM=Delisted, Monitored E=Endangered P=Proposed SC=State Special Concern (non-statutory) T=Threatened General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; NatureServe 2002; CNHP2003.					

The No-Action Alternative would have direct effects on Preble's from the anticipated temporary and permanent take of 74 acres and one acre, respectively, of occupied and potential Preble's habitat while conducting the covered activities individually. The activities covered under the individual ITPs and HCPs could also temporarily fragment habitat and travel corridors between areas of occupied and potential habitat, depending on the number of activities occurring at one time. It would be difficult to determine an upper limit of temporary take that could occur at one time, as each activity would be considered individually and not within a system-wide context, thereby not necessarily considering effects to Preble's from other activities. Under the No-Action Alternative, Denver Water employees system-wide would not be educated on efforts (including avoidance, minimization, and Best Management Practices) that should be implemented for any activity with the potential to impact Preble's or its habitat; only individuals involved in the specific activities that require an ITP would receive this information, and they would be determined on a project-by-project basis. Because each activity would be evaluated separately for its impacts on Preble's and its habitat, the habitat at sites where take may occur would not be managed with a system-wide approach. Mitigation measures would likely be implemented, however, it is unlikely that conservation easements would be set aside to offset individual activities that have a few acres of temporary take (e.g., foreseeable activities involving the Kassler and Waterton Canyon property). Monitoring and reporting requirements would likely be less intensive for the individual ITPs and HCPs that cover relatively small acreages of Preble's habitat. This could result in some long-term loss of habitat after monitoring requirements in the individual ITPs were no longer applicable. Therefore, the determination of effect for Preble's under the No-Action Alternative would be may affect/likely to adversely affect.

The No-Action Alternative is not anticipated to have direct or indirect impacts that would harm or harass the bald eagle. A communal bald eagle roost is present along a portion of the Cheesman Reservoir shoreline, however, the area is considered unsuitable Preble's habitat (see **Figure 7**). Although potential Preble's habitat does occur on the creeks that feed the reservoir, none of the activities that could result in take of Preble's or its habitat would be conducted within one stream mile of the communal roost or within one stream mile of a nest site. Effects on foraging bald eagles would not be anticipated. Therefore, the determination of effect for bald eagles under the No-Action Alternative would be no effect. Should impacts to bald eagles become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

In some cases, Preble's habitat may overlap with Pawnee montane skipper habitat, primarily because of the proximity of upland skipper habitat that may also be used by Preble's. Preble's upland habitat use has been confirmed from tracking radio-telemetered animals into upland grass/shrublands on the Colorado piedmont. Preble's use of the ponderosa pine/blue grama uplands that serve as Pawnee montane skipper habitat has not been confirmed. Preble's use in such open stands with low groundcover is probably limited, because of its affinity for dense groundcover vegetation. Although no occurrences of Pawnee montane skipper have been documented on or near Denver Water property within the planning area covered by the HCP (CNHP 2003), current activities conducted within its habitat have been covered through prior consultation with the Service and in subsequent biological opinions. Few of the activities under the No-Action Alternative would occur in the ponderosa pine/blue grama plant communities

that may occupy upland areas adjacent to Preble's habitat on Denver Water properties. Therefore, the determination of effect for the Pawnee montane skipper under the No-Action Alternative would be no effect. Should impacts to Pawnee montane skipper become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

The Ute ladies' tresses or its habitat may be found on some Denver Water properties in Boulder and Jefferson Counties within the HCP boundary (Spackman et al. 1997). A population was located along Doudy Draw near Community Ditch approximately two miles downstream of the Denver Water siphon crossing, however there were no populations observed near the South Boulder Canal (Hogan 1994). There have been no occurrences of Ute ladies' tresses documented on Denver Water property within the planning area covered by the HCP (CNHP 2003), and there are no activities that are anticipated in potential habitat at this time. Therefore, the determination of effect for the Ute ladies' tresses under the No-Action Alternative would be no effect. However, if a proposed activity has the potential to affect Ute ladies' tresses habitat (sub-irrigated alluvial soils along streams and floodplain meadows between 4,500-6,800 feet), a survey would be conducted according to Service guidelines (USFWS 1992). If Ute ladies' tresses were found in proximity to locations where Denver Water activities are proposed, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

Black-tailed prairie dog habitat does not generally overlap with Preble's habitat. They may share an edge on some occasions, but black-tailed prairie dog foraging activity typically removes the dense vegetation cover that Preble's requires. Populations of black-tailed prairie dogs may exist on Denver Water properties within the planning area covered by the HCP, however, there are no activities that are anticipated to affect these populations or their habitat at this time. Therefore, the determination of effect for black-tailed prairie dogs under the No-Action Alternative would be no effect.

Few of the activities necessary for Denver Water to operate and maintain its water system would occur in alpine and montane coniferous and/or mixed forests used by Canada lynx, or Canada lynx foraging habitat (open forests, rocky areas, and tundra). No occurrences of the Canada lynx have been documented on or near Denver Water property within the planning area covered by the HCP (CNHP 2003), and impacts to Canada lynx are not anticipated from the No-Action Alternative. Therefore, the determination of effect for the Canada lynx under the No-Action Alternative would be no effect. Should impacts to Canada lynx become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

Habitat for the Mexican spotted owl is only present on Denver Water's Upper South Platte Properties, including Cheesman Reservoir, and the species is known to occur in Pike National Forest. However, the Mexican spotted owl has never been documented on the Upper South Platte Properties (CNHP 2003). There are no foreseeable activities on the Upper South Platte Properties that would harm or harass the species, including transients, or result in disturbances to Mexican spotted owl habitat, including nest sites which are typically located in side canyons. Effects to the Mexican spotted owl would not be anticipated under the No-Action Alternative.

Therefore, the determination of effect for the Mexican spotted owl under the No-Action Alternative would be no effect. Should impacts to Mexican spotted owls become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

In northeastern Colorado, mountain plover nesting often occurs in shortgrass prairie with a history of heavy grazing, or in low shrub semideserts. Nesting areas are characterized by very short vegetation and significant areas of bare ground, typically less than 30% vegetation cover, which may be the minimum requirement (Graul 1975, Graul and Webster 1976, Knowles et al. 1982, Olson 1984, Olson and Edge 1985, Olson-Edge and Edge, 1987, Knopf and Miller 1994, Knopf 1996). The mountain plover also avoids moist soils. Although Preble's habitat can include shortgrass prairie, vegetation must be dense. Preble's is also more likely to occur in riparian areas where soils are moist. There is very little overlap between Preble's habitat and mountain plover habitat. Although some of the activities under the No-Action Alternative may occur in habitat suitable for the mountain plover, there have been no known occurrences of this species on or near Denver Water property within the planning area covered by the HCP (CNHP 2003). Therefore, the determination of effect for the mountain plover under the No-Action Alternative would be no effect. Should impacts to mountain plovers become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

The greenback cutthroat trout is not known to occur in the creeks or reaches of the South Platte River in the planning area covered by the HCP. In the South Platte drainage, the most stable populations are located in Rocky Mountain National Park in western Boulder County. Although habitat for this species exists elsewhere, strong competition from introduced trout, diversion of water for irrigation, dams, and water pollution caused by mining and logging (including sedimentation) have restricted the species from reaching its historic distribution from the headwaters to the foothills of the South Platte drainage. No occurrences of greenback cutthroat trout have been documented on or near Denver Water properties within the planning area covered by the HCP (CNHP 2003). Additionally, none of the activities covered in the No-Action Alternative are anticipated to degrade stream conditions in a manner that could effect the greenback cutthroat trout. Therefore, the determination of effect for the greenback cutthroat trout under the No-Action Alternative would be no effect. Should impacts to the greenback cutthroat trout or its habitat become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

The Colorado butterfly plant is known from small populations in southeastern Wyoming, western Nebraska, and north-central Colorado at elevations from 5,800–6,200 feet (Spackman et al. 1997). There are a few known occurrences on private parcels in Boulder and Douglas Counties, but no populations are known on Denver Water properties. The Colorado Natural Heritage Program element occurrence records for this species indicates that it does not occur on or near Denver Water property within the planning area covered by the HCP (CNHP 2003). It is unlikely that populations of Colorado butterfly plant would be found on Denver Water property because the majority of potential habitat had been surveyed prior to the 2000 listing (USFWS 2003), and most (if not all) of the known Colorado populations are on stream floodplains of the eastern plains (Jennings pers. comm.). The HCP boundary ranges from the

edge of the Colorado foothills westward into the mountains at 7,600 feet, and no activities are proposed in Colorado butterfly plant habitat. Therefore, the determination of effect for the Colorado butterfly plant under the No-Action Alternative would be no effect. However, if Denver Water anticipates conducting an activity in suitable habitat, a qualified biologist would survey the area for the presence of Colorado butterfly plant (there are no formal survey guidelines at this time). If the Colorado butterfly plant is found, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

Cumulative Impacts. Cumulative effects to federally-listed, proposed, and candidate species are based on an analysis of past, present, and reasonably foreseeable future actions along the Front Range with potential effects of this alternative. Activities that may have cumulative effects include continued development along the Front Range, continued drought, and implementation of Preble's HCPs currently being developed by Boulder, Douglas, Jefferson, and El Paso Counties, as well as by private land owners. Because many of the federally listed species considered in this EA, especially Preble's, use riparian and adjacent upland habitats, increased impervious surfaces, increased urban predators, new trails and increased trail use in riparian and upland habitat, and increases in exotic species of plants as a result of development could affect the distribution of these species. New utility lines and transportation corridors, additional agricultural practices, and increased demand for sand and gravel as a result of development could also affect these species directly (e.g., taking of listed species or their habitat) and indirectly (e.g., disturbing the foraging activities of bald eagles). This would result in short- and long-term, minor, adverse impacts on federally-listed, proposed, and candidate species.

Continued drought could affect stream flows, which in turn could affect the distribution of wetlands, riparian areas, aquatic habitat, and upland floodplain plant communities used by many of the federally-listed, proposed, and candidate species considered in this EA, including Preble's. Continued drought along the Front Range is anticipated to result in short- and long-term, negligible to minor, adverse impacts on federally-listed, proposed, and candidate species.

The implementation of Preble's HCPs under development would allow for the take of additional Preble's habitat, which would directly affect Preble's and its habitat. It is currently unknown how much take would be authorized under these HCPs, and it is difficult to estimate the short-term impacts to Preble's or its habitat. However, the long-term goals of the HCPs are to protect habitat for Preble's while allowing the counties and private land owners to conduct otherwise legal activities that result in incidental take. This could be considered a regional conservation effort that would also protect other federally-listed, proposed, and candidate species through indirect conservation of their habitat. Also, impacts of the HCPs on federally-listed, proposed, and candidate species, including Preble's, would require section 7 consultation with the Service. Therefore, short-term impacts would likely be adverse, while long-term, minor, beneficial effects to federally-listed, proposed, and candidate species would be anticipated.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor, adverse cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to federally-listed,

proposed, and candidate species associated with development and drought, as well as protection of these resources within a regional conservation context.

Conclusion. The determination of effect for Preble's would be may affect/likely to adversely affect under the No-Action Alternative. The determination of effect for the bald eagle, Pawnee montane skipper, Ute ladies' tresses, black-tailed prairie dog, Canada lynx, Mexican spotted owl, mountain plover, greenback cutthroat trout, and the Colorado butterfly plant would be no effect under the No-Action Alternative. Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor, adverse cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to federally listed species associated with development and drought, as well as protection of these resources within a regional conservation context.

State

The state-listed species considered in this EA have the potential to occur in the planning area covered by the HCP. While some of these species, such as the white pelican, are known to use Denver Water properties within the HCP boundary, the use of these properties by the remaining species is unknown (CNHP 2003). However, given the small acreages that are anticipated to be disturbed by the proposed activities (74 acres temporarily and one acre permanently), the No-Action Alternative is anticipated to have short- and long-term, negligible to minor, adverse impacts on state-listed species. Table 7 provides a summary of the methods used to determine impacts.

Cumulative Impacts. Cumulative effects to state-listed species are based on an analysis of past, present, and reasonably foreseeable future actions along the Front Range, in combination with potential effects of the No-Action Alternative. The sources of effects related to development, drought, and implementation of HCPs along the Front Range described under cumulative impacts for federally-listed, proposed, and candidate species would apply to the state-listed species considered in this EA. Many of the state listed species utilize wetland, riparian, and upland floodplain plant communities that would be adversely affected by development and drought. In addition, the construction of new utility lines and road corridors could require temporary impacts to aquatic habitat that may support sensitive species of fish along the Front Range. Continued development and drought would be anticipated to have short- and long-term, negligible to minor, adverse impacts on state-listed species.

The implementation of Preble's HCPs currently under preparation would allow for disturbance of wetland, riparian, and upland floodplain plant communities used by some these species in the short-term. As it is currently unknown how much disturbance would be authorized under these HCPs, it is difficult to estimate the short-term impacts would be to state-listed species. However, the long-term goals of the HCPs are to protect habitat for Preble's while allowing the counties and private land owners to conduct otherwise legal activities that result in incidental take. This could be considered a regional conservation effort that would also protect state listed species through indirect conservation of the common habitat. Therefore, short-term cumulative impacts would likely be adverse, while long-term, negligible to minor, beneficial cumulative effects to state-listed species would be anticipated.

TABLE 7. SUMMARY OF IMPACTS FOR STATE LISTED SPECIES

COMMON NAME	SCIENTIFIC NAME	STATUS FEDERAL / STATE	MAJOR HABITAT(S) OCCUPIED	POTENTIALLY IN COUNTY ¹	ANTICIPATED IMPACTS
MAMMALS					
River otter	<i>Lontra canadensis</i>	— / E	Riparian / Wetland	B,J	Temporary impacts to aquatic habitat (from stream diversions and dewatering of construction sites) could affect river otter habitat. However, the river otter has never been documented on or near Denver Water properties within the planning area covered by the HCP (CNHP 2003). Therefore, short- and long-term, negligible adverse impacts to potential river otter habitat could occur under the No-Action Alternative.
BIRDS					
American peregrine falcon	<i>Falco peregrinus anatum</i>	DM / SC	Riparian / Wetland Upland	B,D,J	Suitable habitat for peregrine falcon nests occurs in the canyons of some Denver Water properties. It is likely that this species also forages on most Denver Water properties within the planning area covered by the HCP. The activities under the No-Action Alternative would not likely result in disturbances to nesting falcons, but short- and long-term, negligible, adverse impacts could occur to foraging individuals.
Barrow's goldeneye	<i>Bucephala islandica</i>	— / SC	Riparian / Wetland	B,D,J	Suitable wintering and nesting habitat for Barrow's goldeneye (e.g., lakes with dense vegetation and stream banks) occurs on Denver Water properties within the planning area covered by the HCP. However, the species has not been documented on or near the properties within the HCP boundary (CNHP 2003). Therefore, activities under the No-Action Alternative with the potential to affect lakes and stream banks could have short- and long-term, negligible, adverse impacts on Barrow's goldeneye.
Ferruginous hawk	<i>Buteo regalis</i>	— / SC	Upland	B,D,J	Mature cottonwoods and willows along the streams at lower elevations provide habitat for the ferruginous hawk, which is known to occur on Denver Water properties within the planning area covered by the HCP (CNHP 2003). Therefore, under the No-Action Alternative, short- and long-term, negligible to minor, adverse impacts would be expected to this species.
Greater sandhill crane	<i>Grus canadensis</i>	— / SC	Riparian / Wetland	B,D,J	Although suitable habitat for greater sandhill cranes may exist on Denver Water properties, this species has never been documented on or near the properties within the boundary of the planning area covered by the HCP (CNHP 2003). Impacts to potential roosting habitat for this species (e.g., on alluvial islands of braided streams and rivers) would be short- and long-term, negligible, and adverse.
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co., General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; NatureServe 2002; CNHP2003.					--- = no designated status DM=delisted, monitored E=Endangered SC = State Special Concern (non-statutory) T=Threatened

COMMON NAME	SCIENTIFIC NAME	STATUS FEDERAL / STATE	MAJOR HABITAT(S) OCCUPIED	POTENTIALLY IN COUNTY ¹	ANTICIPATED IMPACTS
Long-billed curlew	<i>Numenius americanus</i>	— / SC	Riparian / Wetland Upland	B,D,J	Although suitable habitat for the long-billed curlew may exist on Denver Water properties, this species has never been documented within the boundary of the planning area covered by the HCP (CNHP 2003). Impacts to potential nesting and non-breeding habitat for this species (e.g., on grassy meadows near water, moist meadows, and beaches and mudflats) would be short- and long-term, negligible, and adverse.
Plains sharp- tailed grouse	<i>Tympanuchus phasianellus jamesii</i>	— / E	Upland	D,J	This species is known to occur within one mile of Denver Water properties within the planning area covered by the HCP (CNHP 2003). During nesting and brooding, the plains sharp-tailed grouse requires a mosaic of dense grasses and shrubs, and often relies on riparian areas for feeding, roosting, and escape cover during winter. As these habitat requirements overlap with that of Preble's, the activities under the No-Action Alternative are anticipated to have short- and long-term, minor, adverse impacts on the plains sharp-tailed grouse and its habitat.
Western burrowing owl	<i>Athene cunicularia</i>	— / T	Upland	B,D,J	Black-tailed prairie dog burrows that could support western burrowing owl may exist on Denver Water properties within the planning area covered by the HCP. However, the western burrowing owl has not been documented on or near Denver Water properties within the planning area covered by the HCP (CNHP 2003), and there are no activities that are anticipated in their habitat at this time. Therefore, impacts to the western burrowing owl are not expected to occur.
White pelican	<i>Pelecanus erythrorhynchos</i>	— / SC	Riparian / Wetland	B,D,J	The white pelican is known to occur as a transient on and near Denver Water properties. The habitat used by nesting white pelicans (islands and peninsulas of freshwater lakes) would not be disturbed under this alternative. However, habitats utilized otherwise include lakes and reservoirs. Denver Water activities near such water bodies could have short- and long-term, negligible to minor, adverse impacts on the white pelican.
AMPHIBIANS					
Northern leopard frog	<i>Rana pipiens</i>	— / SC	Riparian / Wetland	B,D,J	Suitable habitat for the northern leopard frog is likely available along the slow streams, canals, floodplains, and reservoirs within the planning area covered by the HCP. This habitat, which overlaps with Preble's habitat, usually has permanent water and rooted aquatic vegetation nearby. However, no occurrences of the species have been documented on or near Denver Water properties within the HCP boundary (CNHP 2003). Therefore, impacts from activities under Alternative A are anticipated to have short- and long-term, negligible to minor, adverse impacts on the northern leopard frog.
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co., General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; NatureServe 2002; CNHP2003.					--- = no designated status DM=delisted, monitored E=Endangered SC = State Special Concern (non-statutory) T=Threatened

COMMON NAME	SCIENTIFIC NAME	STATUS FEDERAL / STATE	MAJOR HABITAT(S) OCCUPIED	POTENTIALLY IN COUNTY ¹	ANTICIPATED IMPACTS
FISH					
Common shiner	<i>Luxilus cornutus</i>	— / T	Riparian / Wetland	B,D,J	Although suitable habitat exists for the common shiner (e.g., clear, cool weedless water, moderate to swift current, gravel to rubble bottoms, and alternating pools and riffles) in the creeks and South Platte River reaches on Denver Water property within the planning area covered by the HCP, the species has not been documented on or near these properties (CNHP 2003). Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on the common shiner.
Iowa darter	<i>Etheostoma exile</i>	— / SC	Riparian / Wetland	B,D,J	Although suitable habitat exists for the Iowa darter (e.g., clear, sluggish, vegetated headwaters, creeks, and small to medium rivers, with sand, peat, and/or organic substrates) in the creeks and South Platte River reaches on Denver Water property within the planning area covered by the HCP, the species has not been documented on or near these properties (CNHP 2003). Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on the Iowa darter.
Lake chub	<i>Couesius plumbeus</i>	— / E	Riparian / Wetland	B,D,J	Although suitable habitat exists for the lake chub (e.g., standing or flowing water, large or small water bodies, commonly with gravel-bottomed pools and runs) in the creeks and South Platte River reaches on Denver Water property within the planning area covered by the HCP (CNHP 2003), the species has not been documented on or near these properties. Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on the lake chub.
Northern redbelly dace	<i>Phoxinus eos</i>	— / E	Riparian / Wetland	B,D,J	Although suitable habitat exists for the northern redbelly dace (e.g., e.g., beaver ponds, pools of headwaters and creeks, often in tea colored water over fine detritus or silt) in the creeks and South Platte River reaches on Denver Water property within the planning area covered by the HCP (CNHP 2003), the species has not been documented on or near these properties. Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on the northern redbelly dace.
Plains minnow	<i>Hybognathus placitus</i>	— / E	Riparian / Wetland	B,D,J	Although suitable habitat exists for the plains minnow (e.g., silt-laden rivers, slower water, and side pools of silty streams; large streams and rivers over beds of sand and silt with some current; clear to highly turbid rivers and creeks with sandy bottoms, high levels of dissolved solids, and slightly to moderately erratic flows) in the creeks and South Platte River reaches on Denver Water property within the planning area covered by the HCP, the species has not been documented on or near these properties (CNHP 2003). Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on plains minnow.
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co., General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; NatureServe 2002; CNHP2003.					--- = no designated status DM=delisted, monitored E=Endangered SC = State Special Concern (non-statutory) T=Threatened

COMMON NAME	SCIENTIFIC NAME	STATUS FEDERAL / STATE	MAJOR HABITAT(S) OCCUPIED	POTENTIALLY IN COUNTY ¹	ANTICIPATED IMPACTS
Plains topminnow	<i>Fundulus sciadicus</i>	— / SC	Riparian / Wetland	B,D,J	Although suitable habitat exists for the plains topminnow (e.g., creeks, and small to medium rivers with moderate to rapid current) in the creeks and South Platte River segments on Denver Water property (within the planning area covered by the HCP), the species has not been documented on or near these properties. Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on plains topminnow.
Suckermouth minnow	<i>Phenacobius mirabilis</i>	— / E	Riparian / Wetland	B,D,J	Although suitable habitat exists for the suckermouth minnow (e.g., moderate turbidity, runs and riffles of creeks and small to medium (sometimes large) rivers with substrates ranging from sand and gravel to large boulders) in the creeks and South Platte River reaches on Denver Water property within the planning area covered by the HCP, the species has not been documented on or near these properties (CNHP 2003). Therefore, activities with the potential to disturb aquatic habitat under the No-Action Alternative could have short- and long-term, negligible to minor, adverse impacts on suckermouth minnow.
¹ B=Boulder Co., D=Douglas Co., J=Jefferson Co., General References: CDOW 2000, 2000a; USFWS 2001, 2001a, 2001b; NatureServe 2002; CNHP2003.					--- = no designated status DM=delisted, monitored E=Endangered SC = State Special Concern (non-statutory) T=Threatened

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor, adverse, cumulative effects, and long-term, negligible, beneficial cumulative effects, when considered with the No-Action Alternative, because of impacts to state listed species associated with development and drought, as well as protection of these species within a regional conservation context.

Conclusion. The No-Action Alternative is anticipated to have short- and long-term, negligible to minor, adverse, impacts on state listed species. Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor, adverse, cumulative effects, and long-term, negligible, beneficial, cumulative effects, when considered with the No-Action Alternative, because of impacts to state listed species associated with development and drought, as well as protection of these species within a regional conservation context.

4.5.5 Cultural Resources

Under the No-Action Alternative, activities necessary to operate and maintain the Denver Water system that involve no ground disturbance, and/or that may involve minimal ground disturbance but occur within the existing footprint of previous activities (and in areas therefore disturbed), would have no effect on historic properties. Such activities could include the following, however, a final list would be negotiated with the SHPO prior to conducting the activity:

Ongoing Operations and Maintenance Related Activities

1. Rodent Control within 10 feet of or inside of any structure
2. Ongoing agricultural activities (does not apply to new agricultural practices that increase impacts to, or further encroach upon, Preble's habitat)
3. Maintenance and replacement of existing landscaping and related structures and improvements
4. Irrigation and associated activities, including operation and maintenance of irrigation facilities, pumping, maintenance and operation of diversions and headgate structures
5. Fence maintenance
6. Scientific measuring device repair, rehabilitation, replacement and maintenance. This includes, but is not limited to, stream gaging stations and water quality monitoring stations
7. Bridge crossing rehabilitation, repair and maintenance within the existing footprint with no associated negative impacts
8. Dam maintenance within the existing footprint
9. Existing uses of water associated with the exercise of perfected water rights pursuant to state law and interstate compacts and decrees
10. Existing manmade changes in hydrology, including without limitation, runoff from urban development, storm control, discharges from conduits for maintenance or emergency, diversion facilities and dams
11. Domestic pet predation from existing development
12. Maintenance of existing features listed in paragraph IV.B of the HCP
13. Weed control

14. Vegetation management
15. Ditch Maintenance (except at the South Boulder Canal and the High Line Canal, which are addressed separately in this HCP): Preble's meadow jumping mice may be taken incidental to normal and customary ditch maintenance activities, as described in the HCP (Denver Water 2003)
16. Existing utilities replacement within existing utility corridors
17. Temporary dewatering of construction sites
18. Fire hydrant replacement at existing locations
19. Siphon replacement at existing locations, as long as siphon is not a component of a historic property
20. Culvert replacement at existing locations as long as culvert is not a component of a historic property
21. Diversion structure replacement on Denver Water Board or private owners property, as long as diversion structure is not a historic property or a component of a historic property
22. Emergency situations including wildfires, dam failure, infestations, floods, and acts of war or terrorism
23. Canal efficiency improvements that do not involve alteration of a historic property or component, i.e., installing a lining
24. Temporary dewatering of construction sites
25. Fire hydrant construction
26. Repairs to property damage

Specific Activities

1. Ditch maintenance related to the High Line Canal
2. Sediment removal at Strontia Springs Reservoir
3. High Line Canal System Refinements, defined in the HCP as installing a liner in the bed of the canal

Under the No-Action Alternative, individual activities that did not require a federal permit (ITP), including those exempted under the 4(d) rule, would not require a review under section 106 of the National Historic Preservation Act. Activities requiring a federal permit (ITP) that involve new ground disturbance and/or potential removal or significant alteration of mechanical features of canals and ditches would require review under section 106 of the National Historic Preservation Act. If after evaluation, no historic properties were identified within the area of potential effect, then there would be no effect on historic properties under this scenario. However, if historic properties were found to exist within the area of potential effect, then potential effects would be assessed. If effects were determined to not affect the character-defining features of a historic resource or to not impact portions of archaeological sites that make them eligible for the NRHP, then a no adverse effect determination would likely apply. However, in some cases proposed impacts could be adverse. For example, if character-defining features of NRHP eligible ditches and canals, such as siphons or other mechanical features, were to be removed or altered, or if the canal or ditch were to be converted to a buried pipeline, then it is likely that historic properties would be adversely affected. For archaeological sites, typically

determined eligible for the NRHP based on their information potential, disturbance of deposits would likely result in a determination that historic properties would be adversely affected.

Under the No-Action alternative, and for those activities that involve a federal permit (ITP), mitigation of adverse effect would be negotiated and completed prior to undertaking any activity that could result in an adverse effect. For archaeological sites, mitigation is generally in the form of data recovery undertaken in compliance with a research design and data recovery plan approved by the SHPO. Historic American Buildings Survey or Historic American Engineering Record documentation is a typical mitigation measure for buildings, structures, and NRHP-eligible linear features such as canals or ditches.

Cumulative Impacts. Cumulative effects to cultural resources are based on past, present, and reasonably foreseeable future actions along the Front Range, in combination with the potential effects of the No-Action Alternative. Activities that may have cumulative effects include continued development along the Front Range and implementation of Preble's HCPs currently being prepared for Boulder, Douglas, Jefferson, and El Paso Counties, as well as by private land owners. Development along the Front Range has already disturbed if not destroyed numerous cultural resources, including potentially historic features and archaeological sites, and compromised the integrity of others which has led to an adverse effect. Primary disturbance and ecological restoration associated with future development, which would likely occur on private land and not require mitigation for cultural resources, could disturb both historic structures and linear features, such as canals and ditches, as well as archaeological sites. Impacts from the disturbances associated with development would be short- and long-term, minor to moderate, and adverse.

Implementation of the county and private HCPs would require environmental review using the NEPA process. Cultural resources would likely be considered in the NEPA documents for these HCPs, and would require consultation with the SHPO to identify appropriate mitigation measures. This would have a long-term, minor, beneficial effect on historic structures and linear features, as well as archaeological sites.

Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, moderate, adverse cumulative impacts, when considered with the No-Action Alternative, because the beneficial effects of mitigating impacts to cultural resources as a result of implementing HCPs would be outweighed by the past and future impacts from development on private land.

Conclusion. There could be findings of no historic properties affected, no adverse effect, or historic properties adversely affected under the No-Action Alternative. Adverse effects would be mitigated prior to implementation of a specific activity. Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, moderate, adverse cumulative impacts, when considered with the No-Action Alternative, as the beneficial effects of mitigating impacts to cultural resources as a result of implementing HCPs would be outweighed by the past and future impacts from development on private land.

4.6 ENVIRONMENTAL CONSEQUENCES – ALTERNATIVE B: PREFERRED ALTERNATIVE

4.6.1 Denver Water Operations

Under the Preferred Alternative, Denver Water would conduct activities necessary to operate and maintain its water system per the single Preble's HCP and associated ITP issued by the Service. Development of the single HCP and issuance of a single ITP to cover all necessary activities would eliminate the numerous delays and costs associated with acquiring multiple, individual ITPs for each action under the No-Action Alternative. The issuance of the single ITP to cover all of these activities would take three to six months, whereas, the issuance of multiple ITPs, to cover each of the activities separately, would result in delays of four to six years for the combined effect of foreseeable activities and three months to a year for operations and maintenance activities. Therefore, the Preferred Alternative would have short- and long-term, moderate, beneficial effects on Denver Water operations from streamlining the permitting process.

Cumulative Impacts. The cumulative impacts analysis under the Preferred Alternative is the same as described under the No-Action Alternative. Please refer to the cumulative impacts assessment under the No-Action Alternative for a detailed discussion.

Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, negligible to minor, adverse cumulative impacts when considered with the Preferred Alternative, because of increased reliance on Denver Water operations from continued development and drought along the Front Range. This represents an important improvement over the No-Action Alternative that would result from the efficiency gained through Denver Water's single ITP and HCP for Preble's.

Conclusion. Alternative B is expected to have short- and long-term, moderate, beneficial effects on Denver Water operations from streamlining the ITP permitting process. The Preferred Alternative is not anticipated to contribute to any cumulative effects. Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, negligible to minor, adverse cumulative impacts when considered with the Preferred Alternative because the Preferred Alternative will enable the operational flexibility necessary to respond to continued growth and drought issues. This represents an important improvement over the No-Action Alternative that would result from the efficiency gained through Denver Water's single ITP and HCP for Preble's.

4.6.2 Wetland, Riparian, and Aquatic Resources

Under the Preferred Alternative, the activities necessary for Denver Water to operate and maintain its water system would be covered under a single ITP and HCP. Because the level of Preble's habitat take anticipated under this alternative includes wetland, riparian, aquatic, and upland plant communities, the overall impact to wetland, riparian, and aquatic resources must be assessed qualitatively.

In the best case scenario under the Preferred Alternative, Denver Water anticipates up to 74 acres of temporary disturbance, and one acre of permanent disturbance, over 30 years, some of which would occur in wetland, riparian, and aquatic environments. In the worst case scenario, the ITP would permit 65 acres of temporary disturbance and 10 acres of permanent disturbance, should it be required for Denver Water activities necessary to operate and maintain its water system. Under either scenario, no more than 25 acres of temporary disturbance would be allowed at one time. Additionally, the activities exempted under the 4(d) rule in the No-Action Alternative would be covered by the HCP and ITP under either scenario of the Preferred Alternative. Avoidance and minimization efforts, as well as Best Management Practices, would be applied to all covered activities, and all Denver Water employees involved in these activities would be educated to their importance and proper conduct, *under the best and worst case scenarios*. Restoration would begin immediately following each activity that resulted in temporary disturbances, with revegetation to begin by the end of the first full growing season following the disturbance. A return to 70% similarity would be expected within five years *under the best and worst case scenarios*; however, efforts would continue until success is achieved or adaptive management is applied.

Under the best case scenario, Denver Water would create 0.25 acre of riparian shrubland (in addition to 2 acres of upland vegetation) to help offset the anticipated one acre of permanent disturbance. Considering the system-wide approach to educating Denver Water employees on avoidance, minimization, and Best Management Practices, the limit on the amount of temporary disturbance allowed at one time, and the inclusion of the activities exempted under the 4(d) rule, the best case scenario under the Preferred Alternative would have fewer adverse effects when compared to the No-Action Alternative. Short-term, negligible, adverse impacts to wetland, riparian, and aquatic resources from temporary disturbance would be anticipated. However, permanent disturbances would result in short-term, negligible to minor, adverse impacts, until restoration of the site was complete. The creation of 0.25 acre of riparian shrubland would offset some of the impacts to wetland, riparian, and aquatic resources. Given this mitigation, the inclusion of activities exempted under the 4(d) rule, and the advantages of a system-wide management approach, a long-term, minor, beneficial effect would occur under the best case scenario of the Preferred Alternative.

Under the worst case scenario, should the permanent disturbance be greater than one acre, Denver Water would offset the impacts by dedicating a conservation easement at a ratio of 8:1 (i.e., if one additional acre of take occurs, Denver Water would dedicate 8 acres of an easement for Preble's), by enhancements at a ratio of 2:1, or a combination of preservation (6:1) and enhancements (1:1) (Denver Water 2003). Some of this additional mitigation would preserve and/or enhance wetland, riparian, and aquatic resources, although the amount is currently unknown. The short-term impacts under this scenario would result from the disturbances associated with 65 acres of temporary impact and 10 acres of permanent take. Impacts to wetland, riparian, and aquatic resources are anticipated to be negligible to minor and adverse, depending on how much permanent disturbance actually occurs, and given the considerations noted for the best case scenario. However, under this worst case scenario, Denver Water would enhance and/or preserve a minimum of seven acres to mitigate the additional disturbances, some of which would include wetland, riparian, and aquatic resources. This would have a long-term, minor to major, beneficial effect on these resources, given the advantages of a system-wide

management approach, and depending on whether the minimum seven acres or the maximum 72 acres are preserved/enhanced.

Cumulative Impacts. The cumulative impacts analysis under the Preferred Alternative is the same as described under the No-Action Alternative. Please refer to the cumulative impacts assessment under the No-Action Alternative for a detailed discussion.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, cumulative adverse effects, and long-term, negligible to minor, beneficial, cumulative effects, when considered with the Preferred Alternative, because of impacts to wetland, riparian, and aquatic habitat associated with development, as well as protection of these resources within a regional conservation context. An improvement over the No-Action Alternative could result from Denver Water's management of wetland, riparian, and aquatic resources on a system-wide basis as a result of implementing a single HCP.

Conclusion. Under the best case scenario of the Preferred Alternative, short-term, negligible, adverse impacts to wetland, riparian, and aquatic resources are anticipated from the temporary disturbances, while long-term, minor, beneficial effects would occur from the permanent disturbance. Under the worst case scenario, short-term impacts to wetland, riparian, and aquatic resources are anticipated to be negligible to minor from temporary disturbances. Long-term, minor to major beneficial effects would occur depending on the level of mitigation.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, cumulative adverse effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to wetland, riparian, and aquatic habitat associated with development, as well as protection of these resources within a regional conservation context.

4.6.3 Floodplains

In the best case scenario under the Preferred Alternative, Denver Water anticipates up to 74 acres of temporary disturbance, and one acre of permanent disturbance, over 30 years, more of which would occur in upland floodplain plant communities than in wetland, riparian, and aquatic environments (i.e., the burial of the South Boulder Canal siphons across Doudy Draw and Coal Creek would likely disturb more upland floodplain vegetation than wetland and riparian areas, which are generally restricted to the stream corridor, because the project would span the entire floodplain). In the worst case scenario, the ITP would permit 65 acres of temporary disturbance and 10 acres of permanent disturbance, should it be required for Denver Water activities necessary to operate and maintain its water system. Under either scenario, no more than 25 acres of temporary disturbance would be allowed at one time. Additionally, the activities exempted under the 4(d) rule in the No-Action Alternative would be covered by the HCP and ITP under the Preferred Alternative. Avoidance and minimization efforts, as well as Best Management Practices, would be applied to all covered activities, and all Denver Water employees involved in these activities would have been educated on them, under either scenario. Restoration would begin immediately following each activity that resulted in the temporary disturbance, with revegetation to begin by the end of the first full growing season following the disturbance. A

return to 70% similarity would be expected within five years under either scenario, however efforts would continue until success is achieved or adaptive management is applied.

Under the best case scenario, Denver Water would also create at least 2 acres of upland floodplain vegetation to offset the anticipated one acre of permanent disturbance. Considering the system-wide approach to educating Denver Water employees on avoidance, minimization, and Best Management Practices, the limit on the amount of temporary disturbance allowed at one time, and the inclusion of activities exempted by the 4(d) rule, the best case scenario under the Preferred Alternative would have fewer adverse effects when compared to the No-Action Alternative. Short-term, negligible to minor, adverse impacts to upland floodplain plant communities from temporary disturbances would be anticipated. However, permanent disturbances would result in short-term, minor, adverse impacts. The creation of 2 acres of upland floodplain vegetation would offset some of the impacts to these plant communities. Therefore, a long-term, negligible to minor, beneficial effect would occur under the best case scenario of the Preferred Alternative, given the advantages of a system-wide management approach and this mitigation

Under the worst case scenario, should the disturbance be greater than one acre, Denver Water would offset the impacts by dedicating a conservation easement at a ratio of 8:1 (i.e., if one additional acre of take occurs, Denver Water would dedicate 8 acres of an easement for Preble's or its habitat), by enhancements at a ratio of 2:1, or a combination of preservation (6:1) and enhancements (1:1) (Denver Water 2003). Some of this additional mitigation would preserve and/or enhance upland floodplain plant communities, although the amount is currently unknown. The short-term impacts under this scenario would result from the disturbance of up to 65 acres of temporary impact and 10 acres of permanent take. These impacts are anticipated to be minor to moderate and adverse, depending on how much permanent disturbance actually occurs. However, under this worst case scenario, Denver Water would enhance and/or preserve a minimum of seven acres to mitigate the additional disturbances, some of which would include upland floodplain vegetation. This would have a long-term, minor to major, beneficial effect on these plant communities, given the advantages of a system-wide management approach, and depending on whether the minimum seven acres or the maximum 72 acres are preserved/enhanced.

Although this discussion focuses on upland floodplain plant communities, consideration was also given to the physical characteristics and values of floodplains. None of the activities covered under the Preferred Alternative are anticipated to affect the physical characteristics or values of floodplains in the planning area covered by the HCP.

Cumulative Impacts. The cumulative impacts analysis under the Preferred Alternative is the same as described under the No-Action Alternative. Please refer to the cumulative impacts assessment under the No-Action Alternative for a detailed discussion.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, cumulative adverse effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to floodplains associated with development, as well as protection of these resources within a regional conservation context. The improvement over the No-Action Alternative would result

from Denver Water's management of floodplains, including upland floodplain plant communities, on a system-wide basis as a result of implementing a single HCP.

Conclusion. Short-term, negligible to minor, adverse impacts to upland floodplain plant communities from temporary disturbances would be anticipated under the best case scenario for the Preferred Alternative. However, permanent disturbances would result in short-term, minor, adverse impacts. The creation of 2.25 acres of upland floodplain vegetation would offset some of the impacts to these plant communities, and therefore, a long-term, negligible to minor, beneficial effect would occur under the best case scenario of the Preferred Alternative. Under the worst case scenario, short-term impacts are anticipated to be minor to moderate and adverse, depending on how much permanent disturbance actually occurs. However, under this worst case scenario, Denver Water would enhance and/or preserve a minimum of seven acres to mitigate the additional disturbances, some of which would include upland floodplain vegetation. This would have a long-term, minor to major, beneficial effect on these plant communities, depending on whether the minimum seven acres or the maximum 72 acres are preserved/enhanced.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, minor to moderate, cumulative adverse effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to floodplains associated with development, as well as protection of these resources within a regional conservation context. The improvement over the No-Action Alternative would result from Denver Water's management of floodplains, including upland floodplain plant communities, on a system-wide basis as a result of implementing a single HCP.

4.6.4 Threatened and Endangered Species, and Species of Special Concern

Under the Preferred Alternative, Denver Water activities necessary to operate and maintain its water system that might result in take of Preble's habitat would occur under a single HCP and ITP. However, the HCP and ITP would not cover take for any of the other federally listed threatened or endangered species. If take is anticipated for other federally listed species, additional consultation and permitting will be required.

Federal

In the best case scenario under the Preferred Alternative, Denver Water anticipates up to 74 acres of temporary take, and one acre of permanent take, of Preble's habitat over 30 years. In the worst case scenario, the ITP would permit 65 acres of temporary disturbance and 10 acres of permanent disturbance, should it be required for Denver Water activities necessary to operate and maintain its water system. Under the Preferred Alternative, no more than 25 acres of temporary take Preble's would be permitted, reducing the potential to temporarily fragment habitat and travel corridors between areas of occupied and potential habitat. Nonetheless, fragmentation could still occur. In either scenario, Denver Water employees system-wide would be educated on efforts (including avoidance, minimization, and Best Management Practices) that should be implemented for any activity with the potential to impact Preble's or its habitat. Each activity in Preble's habitat would be managed from a system-wide perspective, allowing an

overall conservation ethic to be established. Mitigation measures would be implemented, including up to 72 acres of conservation easements that could be set aside to offset permanent take. Monitoring and reporting requirements described in Section 2.3.5 would allow Denver Water to track their preservation, restoration, and enhancement efforts. This could eliminate some of the long-term loss of habitat that may result under the No-Action Alternative. Regardless of these efforts to avoid, minimize, and mitigate impacts to Preble's or its habitat, up to 10 acres of permanent take could result under the Preferred Alternative. Therefore, the determination of effect for Preble's under the Preferred Alternative would be may affect/likely to adversely affect. However, beneficial effects to Preble's would be anticipated with implementation of the HCP under the Preferred Alternative over the long-term.

The impacts of implementing the Preferred Alternative on the remainder of the federally listed or candidate species considered in this EA, including bald eagles, Pawnee montane skipper, Ute ladies' tresses, black-tailed prairie dogs, Canada lynx, Mexican spotted owl, mountain plover, greenback cutthroat trout, and the Colorado butterfly plant species are anticipated to be the same as those for the No-Action Alternative. For each of these species, the detailed determination of effect in Section 4.5.4 under the No-Action Alternative is summarized below. It should be noted that if impacts to any of these species become a concern, inter-agency consultation with Denver Water and Service staff, and as appropriate other federal agencies, will be required for compliance with section 7 of the Act.

Effects on roosting and foraging bald eagles on Denver Water properties covered by the HCP are not anticipated from the Preferred Alternative. None of the activities necessary for Denver Water to operate and maintain its water system would occur within one mile of known roost or nest sites, and the activities would not affect foraging individuals. Therefore, the determination of effect for bald eagles under the Preferred Alternative would be no effect.

Although Preble's habitat can overlap with Pawnee montane skipper habitat (Ponderosa pine/blue grama uplands), Preble's use of skipper habitat has not been confirmed. No occurrence of the Pawnee montane skipper has been documented on Denver Water properties (CNHP 2003), and current activities conducted within its habitat have been covered through prior consultations with the Service and in subsequent Biological Opinions. Few of the activities covered by the HCP would occur in Pawnee montane skipper habitat, therefore, the determination of effect for this species under the Preferred Alternative would be no effect.

Although habitat for the Ute Ladies'-Tresses is available on Denver Water property within the planning area covered by the HCP, there have been no occurrences of Ute ladies' tresses documented (CNHP 2003), and there are no anticipated effect to potential habitat at this time. Therefore, the determination of effect for the Ute ladies' tresses under the Preferred Alternative would be no effect.

Populations of black-tailed prairie dogs may exist on Denver Water properties within the planning area covered by the HCP, however, there are no activities that are anticipated to affect these populations or their habitat. Therefore, the determination of effect for black-tailed prairie dogs under the Preferred Alternative would be no effect.

Few of the activities necessary for Denver Water to operate and maintain its water system would occur in boreal and montane coniferous and/or mixed forests used by Canada lynx, or in Canada lynx foraging habitat (open forests, rocky areas, and tundra). No occurrences of the Canada lynx have been documented on or near Denver Water property within the planning area covered by the HCP (CNHP 2003), and impacts to Canada lynx are not anticipated from the Preferred Alternative. Therefore, the determination of effect for the Canada lynx under the Preferred Alternative would be no effect.

Habitat for Mexican spotted owl is only present on Denver Water's Upper South Platte Properties, including Cheesman Reservoir, and it is known to occur in Pike National Forest. However, the Mexican spotted owl has never been documented on the Upper South Platte Properties (CNHP 2003). There are no foreseeable activities on the Upper South Platte Properties that would harm or harass the species, including transients, or result in disturbances to Mexican spotted owl habitat, including nest sites which are typically located in side canyons. Therefore, the determination of effect for the Mexican spotted owl under the Preferred Alternative would be no effect.

In northeastern Colorado, mountain plover nesting often occurs in sparse shortgrass prairie with a history of heavy grazing, or in low shrub semideserts, with typically less than 30% vegetation cover, which may be the minimum requirement (Graul 1975, Graul and Webster 1976, Knowles et al. 1982, Olson 1984, Olson and Edge 1985, Olson-Edge and Edge, 1987, Knopf and Miller 1994, Knopf 1996). The mountain plover also avoids moist soils. There is very little overlap between Preble's habitat and mountain plover habitat, and there have been no known occurrences of this species on or near Denver Water property within the planning area covered by the HCP (CNHP 2003). Therefore, the determination of effect for the mountain plover under the Preferred Alternative would be no effect.

The most stable populations of greenback cutthroat trout are located in Rocky Mountain National Park in western Boulder County. No occurrences of greenback cutthroat trout have been documented on or near Denver Water properties within the planning area covered by the HCP (CNHP 2003). Additionally, none of the activities covered in the Preferred Alternative are anticipated to degrade stream conditions in a manner that could effect the greenback cutthroat trout. Therefore, the determination of effect for the greenback cutthroat trout under the Preferred Alternative would be no effect.

Colorado Natural Heritage Program element occurrence records for the Colorado butterfly plant indicates that it does not occur on or near Denver Water property within the planning area covered by the HCP (CNHP 2003). It is unlikely that populations of Colorado butterfly plant would be found on Denver Water property because the majority of potential habitat had been surveyed prior to the 2000 listing (USFWS 2003), and most (if not all) of the known Colorado populations are on stream floodplains of the eastern plains (Jennings pers. comm.). The HCP boundary ranges from the edge of the Colorado foothills westward into the mountains at 7,600 feet, and no activities are proposed in Colorado butterfly plant habitat. Therefore, the determination of effect for the Colorado butterfly plant under the No-Action Alternative would be no effect.

Cumulative Impacts. The cumulative impacts analysis under the Preferred Alternative is the same as described under the No-Action Alternative. Please refer to the cumulative impacts assessment under the No-Action Alternative for a detailed discussion.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, negligible to minor, adverse cumulative effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to federally listed species associated with development and drought, as well as protection of these species within a regional conservation context. The improvement over the No-Action Alternative would result from Denver Water's management of Preble's and its habitat, and indirectly habitat of other federally listed species, on a system-wide basis as a result of implementing a single HCP.

Conclusion. The determination of effect for Preble's would be may affect/likely to adversely affect under the Preferred Alternative. The determination of effect for the bald eagle, Pawnee montane skipper, Ute ladies' tresses, black-tailed prairie dog, Canada lynx, Mexican spotted owl, mountain plover, greenback cutthroat trout, and the Colorado butterfly plant would be no effect under the Preferred Alternative. Overall, the past, present, and reasonably foreseeable future actions would have short-term, negligible to minor, adverse cumulative effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to federally listed species associated with development and drought, as well as protection of these species within a regional conservation context. The improvement over the No-Action Alternative would result from Denver Water's management of Preble's and its habitat, and indirectly habitat of other federally listed species, on a system-wide basis as a result of implementing a single HCP.

State

The state listed species considered have the potential to occur within the boundary of the HCP. While some of these species, such as the white pelican, are known to use Denver Water properties within the planning area covered by the HCP, the use of these properties by most of the other species is unknown. However, given the small acreages that will be disturbed by the covered activities, the Preferred Alternative is anticipated to have negligible to minor, adverse impacts on state listed species, over both the short and long term. See Table 7 under the No-Action Alternative for a summary of impacts, as they would be the same under the Preferred Alternative.

Cumulative Impacts. The cumulative impacts analysis under the Preferred Alternative is the same as described under the No-Action Alternative. Please refer to the cumulative impacts assessment under the No-Action Alternative for a detailed discussion.

Overall, the past, present, and reasonably foreseeable future actions would have short-term, negligible to minor, cumulative adverse effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to state listed species associated with development and drought, as well as protection of these species within a regional conservation context. The improvement over the No-Action Alternative would

result from Denver Water's management of Preble's and its habitat, and indirectly habitat of state listed species, on a system-wide basis as a result of implementing a single HCP.

Conclusion. Alternative B is anticipated to have short- and long-term, negligible to minor, adverse impacts on state listed species. Overall, the past, present, and reasonably foreseeable future actions would have short-term, negligible to minor, cumulative adverse effects, and long-term, negligible to minor, beneficial cumulative effects, when considered with the Preferred Alternative, because of impacts to state listed species associated with development and drought, as well as protection of these species within a regional conservation context. The improvement over the No-Action Alternative would result from Denver Water's management of Preble's and its habitat, and indirectly habitat of state listed species, on a system-wide basis as a result of implementing a single HCP.

4.6.5 Cultural Resources

Under the Preferred Alternative, potential effects on historic properties would be the same as for the No-Action Alternative. Activities necessary to operate and maintain the Denver Water system that involve no ground disturbance, and/or that may involve minimal ground disturbance but occur within the existing footprint of previous activities (and in areas therefore disturbed), would have no effect on historic properties. Such activities could include those listed under the No-Action Alternative, however, a final list would be negotiated with the SHPO prior to conducting the activity

Those activities that involve new ground disturbance and/or potential removal or significant alteration of mechanical features of canals and ditches would require review under section 106 of the National Historic Preservation Act. If after evaluation, no historic properties were identified within the area of potential effect, then there would be no effect on historic properties under this alternative. However, if historic properties were found to exist within the area of potential effect, then potential effects would be assessed. If effects were determined to not affect the character-defining features of a historic resource or to not impact portions of archaeological sites that make them eligible for the NRHP, then a no adverse effect determination would likely apply. However, in some cases proposed impacts could be adverse. For example, if character-defining features of NRHP eligible ditches and canals, such as siphons or other mechanical features, were to be removed or altered, or if the canal or ditch were to be converted to a buried pipeline, then it is likely that historic properties would be adversely affected. For archaeological sites, typically determined eligible for the NRHP based on their information potential, disturbance of deposits would likely result in a determination that historic properties would be adversely affected.

Under the Preferred Alternative, mitigation of adverse effect would be negotiated and completed prior to undertaking any activity that could result in an adverse effect. This may include those activities under the No-Action Alternative that are otherwise exempted under the 4(d) rule and/or not subject to a federal permit. For archaeological sites, mitigation is generally in the form of data recovery undertaken in compliance with a research design and data recovery plan approved by the SHPO. Historic American Buildings Survey or Historic American Engineering Record documentation is a typical mitigation measure for buildings, structures, and NRHP-eligible linear features such as canals or ditches.

Cumulative Impacts. The sources of cumulative impacts under the Preferred Alternative are the same as described under the No-Action Alternative. Please refer to the cumulative impacts assessment under the No-Action Alternative for a detailed discussion. However, under the Preferred Alternative, those activities otherwise exempted under the 4(d) rule and/or not subject to a federal permit may be considered for impacts to cultural resources, and appropriate mitigation would be agreed upon. This would have a long-term, negligible to minor, beneficial affect on cultural resources.

Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, minor, adverse cumulative impacts, when considered with the Preferred Alternative, as the beneficial effects of mitigating impacts to cultural resources as a result of implementing HCPs would be outweighed by the past and future impacts from development on private land.

Conclusion. There could be findings of no historic properties affected, no adverse effect, or historic properties adversely affected under the Preferred Alternative. Adverse effects would be mitigated prior to implementation of a specific activity. Overall, the past, present, and reasonably foreseeable future actions would have short- and long-term, minor, adverse cumulative impacts, when considered with the Preferred Alternative, as the beneficial effects of mitigating impacts to cultural resources as a result of implementing HCPs would be outweighed by the past and future impacts from development on private land.

4.7 COMPARATIVE SUMMARY OF THE POTENTIAL ENVIRONMENTAL IMPACTS

TABLE 8. COMPARATIVE SUMMARY OF THE ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

IMPACT TOPIC	ALTERNATIVE A (NO ACTION)	ALTERNATIVE B (PREFERRED ALTERNATIVE)
Denver Water Board Operations	Short-term, moderate, adverse impacts due to time required for permitting multiple ITPs.	Short- and long-term, moderate, beneficial impacts due to timely conduct of covered activities.
Riparian/ Wetland Resources	Short- and long-term, minor to moderate, adverse impacts due to temporary disturbances. Long-term, minor to moderate, adverse impacts due to permanent disturbance.	Under the best case scenario of the Preferred Alternative, short-term, negligible, adverse impacts to wetland, riparian, and aquatic resources are anticipated from the temporary disturbances, while long-term, minor, beneficial effects would occur from the permanent disturbance. Under the worst case scenario, short-term impacts to wetland, riparian, and aquatic resources are anticipated to be negligible to minor from temporary disturbances. Long-term, minor to major beneficial effects would occur depending on the level of mitigation.
Floodplains	Short- and long-term, moderate, adverse impacts due to temporary disturbances. Long-term, minor, adverse impacts due to permanent disturbance.	Under the best case scenario, short-term, negligible to minor, adverse impacts to upland floodplain plant communities from temporary disturbances while permanent disturbances would result in short-term, minor, adverse impacts, until restoration of the site was complete. The creation of 2.25 acres of upland floodplain vegetation would offset some of the impacts to these plant communities. Therefore, a long-term, negligible to minor, beneficial effect would occur, given the advantages of a system-wide management approach and this mitigation. Under the worst case scenario, short-term impacts are anticipated to be minor to moderate and adverse, depending on how much permanent disturbance actually occurs. A long-term, minor to major, beneficial effect on upland floodplain plant communities is anticipated, given the advantages of a system-wide management approach, and depending on whether the minimum seven acres or the maximum 72 acres are preserved/enhanced.
Federally-Listed, Proposed, and Candidate Species	May affect/likely to adversely affect for Preble's No effect for black-tailed prairie dog, Canada lynx, bald eagle, Mexican spotted owl, mountain plover, greenback cutthroat trout, Pawnee montane skipper, Colorado butterfly plant, and Ute ladies' tresses.	May Affect/Likely to Adversely Affect for Preble's No effect for black-tailed prairie dog, Canada lynx, bald eagle, Mexican spotted owl, mountain plover, greenback cutthroat trout, Pawnee montane skipper, Colorado butterfly plant, and Ute Ladies'-Tresses.
State Listed Species	Short- and long-term, negligible to minor, adverse impacts due to small acreage of disturbance.	Short- and long-term, negligible to minor, adverse impacts due to small acreage of disturbance.
Cultural Resources	Findings of no historic properties affected, no adverse effect, or historic properties are adversely affected. Mitigation determined in consultation with SHPO.	Findings of no historic properties affected, no adverse effect, or historic properties are adversely affected. Mitigation determined in consultation with SHPO.

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6.0 GLOSSARY

Definitions from the Habitat Conservation Plan (Denver Water 2003)

Best Management Practices (BMPs): Guidance provided to avoid and minimize take and aid in the restoration of disturbed areas.

Block Clearance Zone: A zone where the Service has determined that Preble's is unlikely to exist. Act restrictions for Preble's do not apply within the defined Block Clearance Zone.

Conservation: Denver Water's management strategy in the Conservation Zones identified by the HCP. This strategy focuses on two goals: (1) prevention of disturbance to existing Occupied and Potential Habitat through avoidance, minimization, and utilization of BMPs when practicable, recognizing, however, that impacts in the Conservation Zones will occur; and (2) replacing Occupied and Potential Habitat that is disturbed or removed through BMPs and Mitigation.

Conservation Zones: Three zones within the Permit Boundary that are specified by location: the North Conservation Zone, South Conservation Zone, and the High Line Canal Conservation Zone. The conservation zones include Denver Water properties that contain occupied and potential Habitat where the majority of the Covered Activities will occur. Conservation is the management strategy in the Conservation Zones.

Covered Activities: All Denver Water activities and projects addressed in the HCP. Covered Activities include operations and maintenance activities, foreseeable projects and activities, activities with insignificant Take, and new activities and projects included through amendment of the HCP.

Denver Water: The City and County of Denver, acting by and through its Board of Water Commissioners, its employees, agents, representatives, consultants, contractors, sub-contractors and other parties over whom Denver Water has authority and/or control.

Mitigation: Denver Water's efforts to benefit the Preble's and offset take.

Occupied Habitat: potential habitat with suitable vegetative conditions for Preble's habitat within one stream-mile of a positive trapping location of the Preble's.

Permit Boundary: The portion of the Preble's Range in Colorado under 7,600 feet in elevation on Denver Water properties. The permit boundary includes occupied, potential, and unsuitable habitat and Block Clearance Zones.

Potential Habitat: Areas on Denver Water properties that meet the criteria of Preble's habitat as determined by the Service guidance (USFWS 1999). Potential Preble's habitat generally has well developed riparian vegetation and relatively undisturbed grasslands, at elevations lower than 7,600 feet, and where trapping to date has not verified the presence or absence of Preble's.

Preble's Range in Colorado: Areas defined by the Service that meet the criteria of Preble's habitat in Boulder, Douglas, El Paso, Adams, Arapahoe, Denver, Elbert, Larimer, Morgan, Weld, and Jefferson counties from an elevation up to 7,600 feet on the western boundary.

Take: As defined by the Act, take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct with regard to a threatened or endangered species. Within the definition of take in the Act, "harm" means an act that actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. For the sole purpose of implementing this HCP, take means the disturbance or removal of occupied or potential Preble's Habitat.

Unsuitable Habitat: Areas on Denver Water's property that meet the criteria of Preble's habitat as determined by the service and identified by Colorado Division of Wildlife Preble's habitat mapping, but that have been determined to be unsuitable through field evaluations and/or negative trapping data. Areas that are unsuitable habitat may have insignificant or no take.

Definitions from the Endangered Species Act

Conservation: using all means necessary to bring a species to the point that it no longer needs the protection of the Endangered Species Act.

Critical habitat: areas essential for the conservation of the species in question. The designation of critical habitat plays several express and direct roles under the Act:

1. Designation forces consideration of economic and other effects
2. The designation process provides guidance for landowners
3. Designation requires "consultation" on federal actions
4. Designation provides an opportunity for judicial review

For more information on Critical Habitat, go to <http://endangered.fws.gov/listing/>

Candidate Species: Any plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species. These are taxa for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions.

Endangered Species: any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the Secretary of the Interior to constitute a pest whose protection under the provisions of the Act would present an overwhelming and overriding risk to man.

Proposed species: Any species of fish, wildlife or plant that is proposed in the *Federal Register* to be listed under section 4 of the Act.

Take: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.

Threatened Species: any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

7.0 CONSULTATION AND COORDINATION

Agencies and organizations contacted for information, that assisted in identifying important issues and developing alternatives, or that will be given an opportunity to review and comment on this EA include the following:

FEDERAL AGENCIES

Department of Energy, Rocky Flats Environmental Technology Site
Pike/San Isabel National Forest
U.S Army Corps of Engineers
U.S. Fish and Wildlife Service, Colorado Field Office

TRIBES

[See Appendix A]

STATE AND LOCAL AGENCIES

Boulder County
City of Boulder
City of Colorado Springs
City of Longmont
Colorado Department of Natural Resources
Colorado Department of Transportation
Colorado Division of Wildlife
Colorado Historical Society, Office of Archaeology and Historic Preservation
Colorado Springs Utilities
Colorado State Forest
Douglas County
El Paso County
Elbert County
Jefferson County

OTHER ORGANIZATIONS

Colorado Cattleman's Association
CPR Marketing
Denver Audubon Society
Lafarge
The Colorado Wildlife Alliance
The Nature Conservancy
Trust for Public Land

8.0 PREPARERS

This EA was prepared by engineering-environmental Management, Inc. (e²M) under the direction of Ms. Jennifer McCurdy, Environmental Planner for the Denver Water Board, and Ms. Anne Winans, Attorney for the Denver Water Board. Denver Water Board Staff, especially Greg Bryant, provided invaluable assistance in the development and technical review of this EA. The preparers of this document are listed below:

Denver Water Board

Jenny McCurdy, Environmental Planner
M.S. Mineral Resource Ecology
B.A. Geology
Years of Experience: 17

Anne Winans, Attorney
J.D. University of Denver School of Law
B.A. Environmental Conservation
Years of Experience: 3

Greg Bryant, Water Resources GIS Coordinator
M.A. Engineering with GIS Concentration
B.A. Wildlife Biology
Years of Experience: 22

Mark E. Bakeman (Consultant)
Ph.D. Natural Resource Management (soils)
M.S. Soils
B.S. Natural Resource Management
Years experience: 24

engineering-environmental Management, Inc. (e²M)

Jayne Aaron, Cultural Resources Program Manager/Environmental Planner
M.A. Environmental Policy and Management
B.A. Environmental Design
Years of Experience: 17

Dan Niosi, Natural Resources Specialist/Planner
B.A. Environmental Studies – Natural Resources
Years of Experience: 3

Lori Rhodes, Cultural Resources Specialist
M.A. Anthropology
B.A. Anthropology
Years of Experience: 17

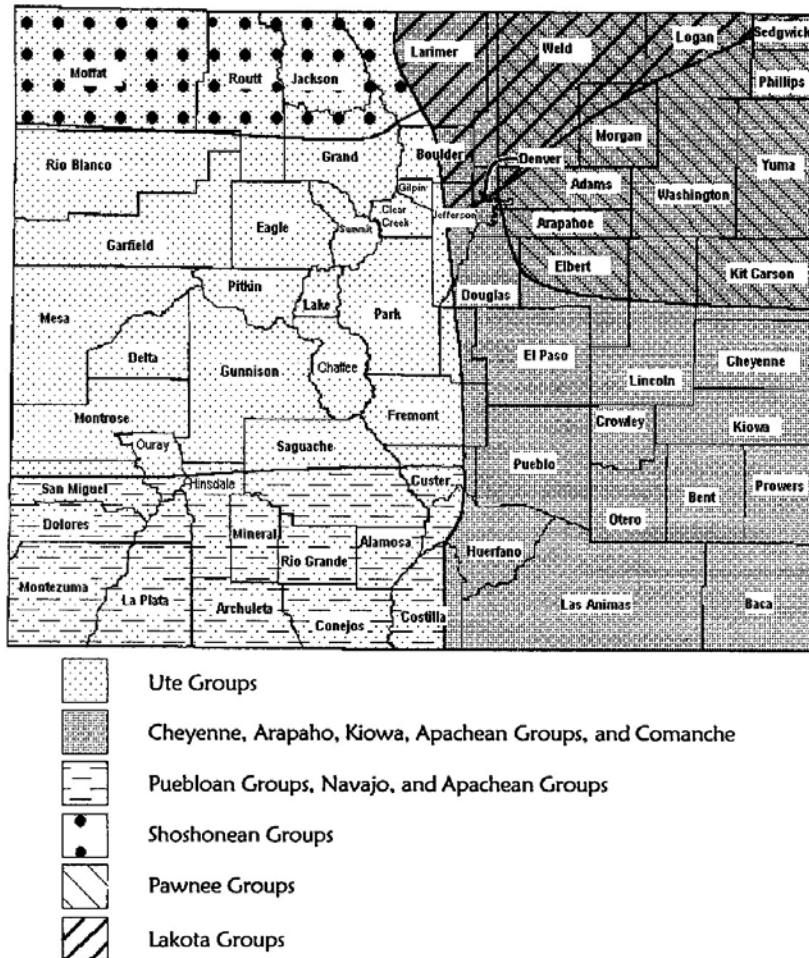
Dr. Cheryl A. Schmidt, Mammalogist
PhD Biology
M.S. Biology
B.S. Biology
Years of experience: 18

Jim Von Loh, Senior Biologist
M.S. Biology
B.S. Biology
Years of Experience: 25

Wanda Gray Lafferty, Technical Publications Specialist
Two years undergraduate study
Years of Experience: 25

APPENDIX A
TRIBAL CONTACT LIST

ESTIMATED TRIBAL TERRITORIES IN COLORADO DURING THE LATE NINETEENTH CENTURY



This map is designed to aid in tribal consultation efforts. The boundaries depicted are approximate only, and should not be interpreted as tribally recognized use areas. Please note that this information is derived largely from observations made during the late 1800's. Tribal territories are a dynamic in nature, and consultations should be conducted accordingly.

**This map has been adapted by the Colorado Commission of Indian Affairs from a document developed by the Colorado Office of Archaeology and Historic Preservation*

COLORADO TRIBAL CONTACTS LIST

Revised October 22, 2002

The "Colorado Tribal Contacts List" has been developed with assistance from the National Park Service NAGPRA Grants program, and is produced through a collegial partnership between the Colorado Commission of Indian Affairs and the Colorado Historical Society. The directory is designed for cultural resource managers and others wishing to contact tribes with a legacy of occupation in Colorado. Per executive memorandum "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), federal agencies are required to consult with Indian nations on a government-to-government basis. Accordingly, the names and addresses of tribal leaders and, if provided, NAGPRA Representatives and Tribal Historic Preservation Officers are listed below. Although this information has been verified by each tribe's administration, it is advisable to confirm contact protocol for each project. Please report corrections and modifications to (303) 866-4531.

Apache Tribe of Oklahoma

Mr. Gene Maroquin, Chairman
 Apache Tribe of Oklahoma
 P.O. Box 1220
 Anadarko, OK 73005 Phone: (405) 247-9493 Fax: (405) 247-2686

Cheyenne and Arapaho Tribes of Oklahoma

Mr. Robert Tabor, Chairman
 Cheyenne & Arapaho Business Committee
 P.O. Box 38
 Concho, OK 73022 Phone: (405) 262-0345 Fax: (405) 262-0745

Mr. Joe Big Medicine, Southern Cheyenne NAGPRA Representative
 500 S. Leach Apt. #36
 Watonga, OK 73772 Phone: (580) 623-2810

Mr. Gordon L. Yellowman, Sr., Southern Cheyenne NAGPRA Representative
 Cheyenne and Arapaho Tribes of Oklahoma
 Roads Construction Program E-mail: gordonyellowman@prodigy.net
 P.O. Box 137
 Concho, OK 73022 Phone: (405) 262-4794 ext. 205 Fax: (405) 262-4865

Mr. Alonzo Sankey, Southern Arapaho NAGPRA Representative
 Cheyenne & Arapaho Tribes of Oklahoma
 P.O. Box 38
 Concho, OK 73022 Phone: (405) 262-0345 Fax: (405) 262-0745

Mr. William Pedro, Southern Arapaho NAGPRA Representative
 P.O. Box 41
 Concho, OK 73022

Cheyenne River Sioux Tribe

Mr. Gregg Bourland, Chairman
 Cheyenne River Lakota Tribal Council
 P.O. Box 590
 Eagle Butte, SD 57625 Phone: (605) 964-4155 Fax: (605) 964-4151

Mr. Sebastian Le Beau, NAGPRA Representative
Cheyenne River Lakota Tribe
P.O. Box 590
Eagle Butte, SD 57625 Phone: (605) 964-7554 Fax: (605) 964-4151

.....

Cochiti Pueblo

Mr. Andrew Quintana, Governor
Cochiti Pueblo
P.O. Box 70
Cochiti, NM 87041 Phone: (505) 465-2244 Fax: (505) 465-1135

Mr. Gilbert Herrera, NAGPRA Representative
Cochiti Pueblo
P.O. Box 70
Cochiti, NM 87041 Phone: (505) 465-2885 Fax: (505) 465-1135

.....

Comanche Tribe of Oklahoma

Mr. Johnny Wauqua, Chairman
Comanche Tribal Business Committee
P.O. Box 908
Lawton, OK 73502 Phone: (580) 492-4988 Fax: (580) 492-3796

Mr. Jimmy Arterberry, THPO/NAGPRA/EOP Director
Comanche Tribe of Oklahoma
P.O. Box 908
Lawton, OK 73502 Phone: (580) 492-4988 Fax: (580) 492-3796

.....

Crow Creek Sioux Tribe

Ms. Roxanne Sazue, Chairwoman
Crow Creek Lakota Tribal Council
P.O. Box 658
Fort Thompson, SD 57325 Phone: (605) 245-2222 Fax: (605) 245-2470

.....

Crow Nation

Mr. Clifford Burdinground, Chairman
Crow Nation
P.O. Box 159
Crow Agency, MT 59022 Phone: (406) 638-2601 x3715 Fax: (406) 638-7283

.....

Fort Sill Apache Tribe

Ms. Ruey Darrow, Chairwoman
Fort Sill Apache Business Committee
Route 2, Box 121
Apache, OK 73006 Phone: (580) 588-2298 Fax: (580) 588-3133

Mr. Leland Michael Darrow, Tribal Historian and NAGPRA Representative
Fort Sill Apache Tribe
Route 2, Box 121
Apache, OK 73006 Phone: (580) 588-2298 Fax: (580) 588-3133

.....

The Hopi Tribe

Mr. Wayne Taylor, Jr., Chairman
Hopi Tribal Council
P.O. Box 123
Kykotsmovi, AZ 86039

Phone: (928) 734-2441

Fax: (520) 734-2435

Mr. Liegh Kuwanwisiwma, Director
Hopi Cultural Preservation Office
P.O. Box 123
Kykotsmovi, AZ 86039

Phone: (520) 734-6636

Fax: (520) 734-2331

Jicarilla Apache Tribe

Ms. Claudia J. Vigil Muniz, President
Jicarilla Apache Tribe
P.O. Box 507
Dulce, NM 87528

Phone: (505) 759-3242

Fax: (505) 759-3005

Ms. Adelaide Paiz
NAGPRA Coordinator
P.O. Box 507
Dulce, NM 87528

Phone: (505) 759-3613

Fax: (505) 759-3005

Kiowa Tribe of Oklahoma

Mr. Billy Evans Horse, Chairman
Kiowa Business Committee
P.O. Box 369
Carnegie, OK 73015

Phone: (580) 654-2300

Fax: (580) 654-2188

Mr. George Daingkau, NAGPRA Representative
Kiowa Tribe of Oklahoma
P.O. Box 369
Carnegie, OK 73015

Phone: (580) 654-2042

Fax: (580) 654-2188

Mescalero Apache Tribe

Ms. Sara Misquez, President
Mescalero Apache Tribe
P.O. Box 227
Mescalero, NM 88340

Phone: (505) 464-4494

Fax: (505) 464-9191

Ms. Elyn Bigrope
NAGPRA Contact/Curator
Mescalero Apache Tribal Cultural Center
P.O. Box 227
Mescalero, NM 88340

Phone: (505) 464-4494 x254

Fax: (505) 464-9191

Navajo Nation

Mr. Kelsey Begay, President
Navajo Nation Tribal Council
P.O. Box 9000
Window Rock, AZ 86515

Phone: (928) 871-7915

Fax: (928) 871-4025

Mr. Alan S. Downer, Historic Preservation Officer
Navajo Nation Historic Preservation Department
P.O. Box 4950
Window Rock, AZ 86515 Phone: (928) 871-7198 Fax: (928) 871-7886

.....

Northern Arapaho Tribe

Mr. Anthony A. Addison, Sr., Chairman
Northern Arapaho Business Council E-Mail: ARAPAHOTRIBE@HOTMAIL.COM
P.O. Box 396
Fort Washakie, WY 82514 Phone: (307) 332-6120 *835 Fax: (307) 332-3055

Mr. Nelson White, NAGPRA Representative
Northern Arapaho Business Council
P.O. Box 396
Fort Washakie, WY 82514 Phone: (307) 332-6120 Fax: (307) 332-7543

.....

Northern Cheyenne Tribe

Ms. Geri Small, Chairwoman
Northern Cheyenne Tribe
P.O. Box 128
Lame Deer, MT 59043 Phone: (406) 477-6284 Fax: (406) 477-6210

.....

Northern Ute Tribe

Mr. D. Floyd Wopsock, Chairman
Uintah & Ouray Tribal Business Committee
P.O. Box 190
Ft. Duchesne, UT 84026 Phone: (435) 722-5141 Fax: (435) 722-2374

Ms. Betsy Chapoose, NAGPRA Representative
Northern Ute Tribe
P.O. Box 190
Ft. Duchesne, UT 84026 Phone: (435) 722-4992 Fax: (435) 722-2374

.....

Oglala Sioux Tribe

Mr. John Yellowbird, President
Oglala Sioux Tribal Council
P.O. Box H
Pine Ridge, SD 57770 Phone: (605) 867-5821 Fax: (605) 867-1788

.....

Paiute Indian Tribe of Utah

Ms. Lora E. Tom, Chairwoman
440 N. Paiute Drive
Cedar City, UT 84720 Phone: (435) 586-1112 Fax: (435) 586-5915

.....

Pawnee Nation of Oklahoma

Mr. Robert L. Chapman, President
Pawnee Nation of Oklahoma
P.O. Box 470
Pawnee, OK 74058 Phone: (918) 762-3621 Fax: (918) 762-2389

Mr. Francis Morris, Repatriation Coordinator
Pawnee Nation of Oklahoma
P.O. Box 470
Pawnee, OK 74058 Phone: (918) 762-3624 Fax: (918) 762-6446

.....
Picuris Pueblo

Mr. Clarence Chile, Governor
Picuris Pueblo
P.O. Box 127
Penasco, NM 87553

Phone: (505) 587-2519

Fax: (505) 587-1071

Mr. Richard Mermejo, NAGPRA Representative
Picuris Pueblo
P.O. Box 127
Penasco, NM, 87553

Phone: (505) 587-2519

Fax: (505) 587-1071
.....

Pueblo of Acoma

Mr. Cyrus J. Chino, Governor
Pueblo of Acoma
P.O. Box 309
Acoma, NM 87034

Phone: (505) 552-6600

Fax: (505) 552-7204

Mr. Ron L. Charlie, NAGPRA Representative
Pueblo of Acoma
P.O. Box 309
Pueblo of Acoma, NM 87034

Phone: (505) 552-6600

Fax: (505) 552-7204
.....

Pueblo of Isleta

Mr. Alvino Lucero, Governor
Pueblo of Isleta
P.O. Box 1270
Isleta, NM 87022

Phone: (505) 869-3111

Fax: (505) 869-4236
.....

Pueblo of Jemez

Mr. Paul Tosa, Governor
Jemez Pueblo
P.O. Box 100
Jemez Pueblo, NM 87024

Phone: (505) 834-7359

Fax: (505) 834-7331

Mr. Mehrdad Khatibi, NAGPRA Representative
Jemez Pueblo
P.O. Box 100
Jemez Pueblo, NM 87024

Phone: (505) 834-7696

Fax: (505) 834-7697
.....

Pueblo of Laguna

Mr. Harry D. Early, Governor
Laguna Pueblo Tribal Council
P.O. Box 194
Laguna, NM 87026

Phone: (505) 552-6654

Fax: (505) 552-6941

Mr. Victor Sarracino, NAGPRA Committee Chairman
P.O. Box 194
Laguna, NM 87026

Phone: (505) 552-6654 x1100
.....

Pueblo of Nambe

Mr. Tom Talache, Governor
Pueblo of Nambe
Route 1, Box 117-BB
Santa Fe, New Mexico 87501

Phone: (505) 455-2036x12

Fax: (505) 455-2038

Mr. Ernest Maribal, NAGPRA Representative
Pueblo of Nambe
Route 1, Box 117-BB
Santa Fe, New Mexico 87501

Phone: (505) 455-2036x12

Fax: (505) 455-2038

Pueblo of Pojoaque

Mr. Jacob Ziarrial, Governor
Pojoaque Pueblo
Route 11, Box 71
Santa Fe, NM 87501

Phone: (505) 455-2278

Fax: (505) 455-2950

Mr. Charlie Tapia, NAGPRA Representative
Pojoaque Pueblo
Route 11, Box 71
Santa Fe, NM 87501

Phone: (505) 455-2915

Fax: (505) 455-2950

Pueblo of Sandia

Mr. Stewart Paisano, Governor
Pueblo of Sandia
Box 6008
Bernalillo, NM 87004

Phone: (505) 867-3317

Fax: (505) 867-9235

Ms. Jenny Holmes, NAGPRA Representative
Pueblo of Sandia
Box 6008
Bernalillo, NM 87004

Phone: (505) 867-3317

Fax: (505) 867-9235

Pueblo of San Felipe

Mr. Lawrence Trancosa, Governor
Pueblo of San Felipe
P.O. Box 4339
San Felipe Pueblo, NM 87001

Phone: (505) 867-3381

Fax: (505) 867-3383

Mr. Bruce Garcia, NAGPRA Representative
Pueblo of San Felipe
P.O. Box 4339
San Felipe Pueblo, NM 87001

Phone: (505) 867-3381

Fax: (505) 867-3383

Pueblo of Santa Ana

Mr. Bruce Sanchez, Governor
Pueblo of Santa Ana
Two Dove Road
Bernalillo, NM 87004

Phone: (505) 867-3301

Fax: (505) 867-3395

Pueblo of Zia

Mr. William Toribio, Governor
Zia Pueblo
135 Capitol Square Drive
Zia Pueblo, NM 87053

Phone: (505) 867-3304

Fax: (505) 867-3308

Mr. Celestino Gachupin and Peter Pino, NAGPRA Representatives
Zia Pueblo
135 Capitol Square Drive
Zia Pueblo, NM 87053

Phone: (505) 867-3304

Fax: (505) 867-3308

Rosebud Sioux Tribe

Mr. Willie Kindel, President
Rosebud Sioux Tribe
P.O. Box 430
Rosebud, SD 57570

Phone: (605) 747-2381

Fax: (605) 747-2243

Mr. Terry Gray, NAGPRA Coordinator
Rosebud Sioux Tribe, RSTSCRM Committee
SGU Heritage Center
BOX 675 Mission
Rosebud, SD 57555

Phone: (605) 856-4901

Fax: (605) 747-2243

San Ildefonso Pueblo

Mr. John Gonzales, Governor
San Ildefonso Pueblo
Rt. 5, Box 315-A
Santa Fe, NM 87501

Phone: (505) 455-2273

Fax: (505) 455-7351

Mr. Myron Gonzales, NAGPRA Representative
San Ildefonso Pueblo
Rt. 5, Box 315-A
Santa Fe, NM 87501

Phone: (505) 455-2273

Fax: (505) 455-7351

San Juan Pueblo

Mr. Wilfred Garcia, Governor
San Juan Pueblo
P.O. Box 1099
San Juan, NM 87566

Phone: (505) 852-4400

Fax: (505) 852-4820

Mr. Herman Agoyo, NAGPRA Representative
San Juan Pueblo
P.O. Box 1099
San Juan, NM 87566

Phone: (505) 852-4211

Fax: (505) 852-9106

Santa Clara Pueblo

Mr. Denny Gutierrez, Governor
Santa Clara Pueblo
P.O. Box 580
Espanola, NM 87532

Phone: (505) 753-7330

Fax: (505) 753-5375

Santo Domingo Tribe

Mr. Ernie Lovato, Governor

Santo Domingo Pueblo

P.O. Box 99

Santo Domingo, NM 87052

Phone: (505) 465-2214

Fax: (505) 465-2688

Shoshone-Bannock Tribes

Mr. Blaine J. Edmo, Chairman

Fort Hall Business Council

P.O. Box 306

Fort Hall, ID 83203

Phone: (208) 478-3700

Fax: (208) 237-0797

Diana Yupe

Tribal Anthropologist/Cultural Resource Coordinator

P.O. Box 306

Fort Hall, ID 83203

Phone: (208) 478-3706

Fax: (208) 237-0797

* NAGPRA correspondence to be addressed to the Chairman with a cc. to Tribal Anthropologist

Shoshone Tribe (Eastern Band)

Ivan Posey, Chairman

Shoshone Business Council

P.O. Box 538

Fort Washakie, WY 82514

E-Mail: ShoshoneTribe@washakie.net

Phone: (307) 332-3532

Fax: (307) 332-3055

Mr. Delphine Clair and Mr. Haman Wise, NAGPRA Representatives

Shoshone Tribe

P.O. Box 538

Fort Washakie, WY 82514

Phone: (307) 332-3532

Fax: (307) 332-3055

Southern Ute Indian Tribe

Mr. Leonard Burch, Chairman

Southern Ute Indian Tribe

P.O. Box 737

Ignacio, CO 81137

Phone: (970) 563-0100

Fax: (970) 563-0396

Mr. Neil Cloud, NAGPRA Coordinator

C/O Ms. Edna Frost, Director of Tribal Information Services

Southern Ute Indian Tribe

P.O. Box 737

Ignacio, CO 81137

E-Mail: efrost@southern-ute.nsn.us

Phone: (970) 563-0100

Fax: (970) 563-0396

Standing Rock Sioux Tribe

Mr. Charles W. Murphy, Chairman

Standing Rock Lakota Tribal Council

P.O. Box D

Fort Yates, ND 58538

Phone: (701) 854-7201

Fax: (701) 854-7299

Mr. Tim Mentz, Cultural Resource Planner

Standing Rock Sioux Tribe

P.O. Box D

Ft. Yates, ND 58538

Phone: (701) 854-2120

Fax: (701) 854-2138

Taos Pueblo

Mr. Vincent J. Lujan, Sr., Governor
Taos Pueblo
P.O. Box 1846
Taos, NM 87571

Phone: (505) 758-9593

Fax: (505) 758-4604

Ms. Reva Suazo, NAGPRA Representative
Taos Pueblo
P.O. Box 2596
Taos, NM 87571

Phone: (505) 751-3870

Fax: (505) 751-3844

Tesuque Pueblo

Mr. Paul Swazo, Governor
Tesuque Pueblo
Route 42, Box 360-T
Santa Fe, NM 87506

Phone: (505) 983-2667

Fax: (505) 982-2331

Mr. Mark Mitchell, Lieutenant Governor & NAGPRA Representative
Tesuque Pueblo
Route 42, Box 360-T
Santa Fe, NM 87506

Phone: (505) 955-7723

Fax: (505) 982-2331

Three Affiliated Tribes (Arikara, Hidatsa, Mandan)

Mr. Tex G. Hall, Chairman
Three Affiliated Tribes Business Council
404 Frontage Road
New Town, ND 58763

Phone: (701) 627-4781

Fax: (701) 627-3626

Mr. Elgin Crow's Breast, Cultural Preservation Officer
Three Affiliated Tribes
HC3, Box 2
New Town, ND 58763

E-Mail: elgincb@ndak.net

Phone: (701) 627-4399

Fax: (701) 627-3625

Ute Mountain Ute Tribe

Mr. Harold Cuthair, Acting Chair
Ute Mountain Ute Tribe
General Delivery
Towaoc, CO 81334

Phone: (970) 565-3751X201

Fax: (970) 565-2374

Mr. Terry Knight Sr., NAGPRA Representative
Ute Mountain Ute Farm & Ranch Enterprise
P.O. Box 53
Towaoc, CO 81334

E-Mail: tknight@hubwest.com

Phone: (970) 565-6412

Fax: (970) 565-9473

White Mesa Ute Tribe

Ms. Mary Jane Yazzie, Chairwoman
White Mesa Ute Council
P.O. Box 7096
White Mesa, UT 84511

Phone: (435) 678-3397

Fax: (435) 678-2220

Wichita and Affiliated Tribes

Mr. Gary McAdams, President
Wichita Executive Committee
P.O. Box 729
Anadarko, OK 73005

Phone: (405) 247-2425 x103

Fax: (405) 247-2430

.....

Ysleta del Sur Pueblo

Mr. Albert Alvidrez, Governor
Ysleta del Sur Pueblo
P.O. Box 17579, Ysleta Station
El Paso, TX 79917

Phone: (915) 859-7913

Fax: (915) 859-4252

Mr. Rick Quezada, NAGPRA Representative
Ysleta del Sur Pueblo
P.O. Box 17579, Ysleta Station
El Paso, TX 79917

Phone (915) 858-1076

Fax: (915) 859-4252

.....

Zuni Pueblo

Mr. Malcolm Bowekaty, Governor
Pueblo of Zuni
P.O. Box 339
Zuni, NM 87327

Phone: (505) 782-4481

Fax: (505) 782-2700

State Indian Affairs Offices

Arizona Commission of Indian Affairs

Ron Lee, Executive Director
1400 W. Washington, Suite 300
Phoenix, AZ 85007

Ron.Lee@indianaffairs.state.az.us
Phone: (602) 542-3123 Fax: (602) 542-3223

Colorado Commission of Indian Affairs

Karen Wilde-Rogers, Executive Secretary
130 State Capitol
Denver, CO 80203

e-mail: Karen.wilde-rogers@state.co.us
Phone: (303) 866-3027 Fax: (303) 866-5469

Kansas Native American Affairs Office

Brad Hamilton, Director
1430 Southwest Topeka Blvd.
Topeka, KS 66612

Phone: (785) 368-7319 Fax: (303) 296-1795

Montana Governor's Office of Indian Affairs

, Program Coordinator (vacant)
State Capitol Building, Room 202
Helena, MT 59620-0401

Phone: (406) 444-3702 Fax: (406) 444-1350

Nebraska Commission on Indian Affairs

Judi Morgan, Executive Director
PO Box 94981
Lincoln, NE 68509-4981

Phone: (402) 471-3475 Fax: (402) 471-9932

New Mexico Office of Indian Affairs

Sam Cata, Acting Executive Director
224 East Palace Ave.
Santa Fe, NM 87501

Phone: (505) 827-6440 Fax: (505) 827-6445

North Dakota Indian Affairs Commission

Cynthia Mala, Executive Director
600 East Blvd., 1st Floor, Judicial Wing
Bismarck, ND 58505

Phone: (701) 328-2428 Fax: (701) 328-3000

Oklahoma Indian Affairs Commission

Barbara Warner, Executive Director
4545 North Lincoln, Suite 282
Oklahoma City, OK 73105

Phone: (405) 521-3828 Fax: (405) 521-0902

Utah Division of Indian Affairs

Forrest S. Cuch, Executive Director
324 S. State St., Suite 500
Salt Lake City, UT 84114

e-mail: FSCUCH@DCED.STATE.UT.US
Phone: (801) 538-8808 Fax: (801) 538-880 3

APPENDIX B

FEDERALLY LISTED SPECIES KNOWN TO OCCUR ALONG THE FRONT RANGE

FEDERALLY LISTED SPECIES KNOWN TO OCCUR ALONG THE FRONT RANGE

[References are available in Chapter 5.0]

Black-tailed Prairie Dog. [Federal Candidate; Colorado Special Concern] This ground-dwelling squirrel occupies a large range in the plains region of central North America, with many occurrences and large population size. However, the extent of occupied habitat and the species' abundance has been reduced from historical levels by 94–99% (NatureServe 2002). The viability of extant populations remains uncertain until further information is available on the effect of the currently reduced colony sizes, fragmentation of habitat, and threats posed by introduced sylvatic plague.

The Service (*Federal Register*, 25 March 1999) found that a petition to list this species as threatened under the Act presented substantial information indicating that listing may be warranted, and a status review was initiated. The Service (2000) determined that listing the black-tailed prairie dog as threatened was warranted but precluded by actions of higher priority.

This is primarily a Great Plains species, originally occurring from extreme southern Saskatchewan (Frenchman River Valley) and Montana south through the western and central Great Plains to the desert grasslands of western Texas, New Mexico, southeastern Arizona (formerly), northeastern Sonora, and northern Chihuahua (Merriam 1902, Koford 1958). It is now extirpated from southeastern Arizona (Van Pelt 1992), southwestern New Mexico, and locally in many other areas throughout the range.

Black-tailed prairie dogs occupy dry, flat, open grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle. Habitat includes all major grassland types--short (Bonham and Lerwick 1976), mixed (Coppock et al. 1983), and tall (Osborn 1942), but they are most abundant and an important community member in the Mixed Grass Prairie and Short Grass Plains associations (Carpenter 1940, in Osborn 1942). Tallgrass prairie habitat is mainly utilized where wild or domestic ungulates or other disturbances have reduced the stature of the tallgrass. Black-tailed prairie dogs then maintain the vegetation in a low stature (Osborn 1942, Koford 1958). They occur in open vacant lots in the Denver Metropolitan area.

Canada Lynx. [Federal Threatened; Colorado Endangered] The Canada Lynx generally occurs in boreal and montane regions dominated by coniferous or mixed forest with thick undergrowth, but also sometimes enters open forest, rocky areas, and tundra to forage for abundant prey. When inactive or birthing, it occupies dens—typically in hollow trees, under stumps, or in thick brush. Den sites tend to be in mature or old growth stands with a high density of logs. This species occurs throughout Alaska and Canada (except arctic islands), south through the Rocky Mountains, northern Great Lakes region, and northern New England. The Canada lynx is considered historically resident in 16 states represented by five ecologically distinct regions: Cascade Range (Washington, Oregon), northern Rocky Mountains (northeastern Washington, southeastern Oregon, Idaho, Montana, western Wyoming, northern Utah), southern Rocky Mountains (southeastern Wyoming, Colorado), northern Great Lakes (Minnesota, Wisconsin, Michigan), and northern New England (Maine, New Hampshire, Vermont, New York, Pennsylvania, Massachusetts). Self-sustaining resident populations currently exist only in Maine, Montana, Washington, and possibly Minnesota. Extant populations which are no longer considered self-sustaining occur in Wisconsin, Michigan,

Oregon, Idaho, Wyoming, Utah, and Colorado. The species may be extirpated from New Hampshire, Vermont, New York, Pennsylvania, and Massachusetts. Reintroduction efforts were undertaken in Colorado, initiated by the Colorado Division of Wildlife in 1999-2000, to re-establish a viable population in this State.

Canada lynx are typically solitary with population densities usually less than 10 lynx per 100-square kilometers. Male home ranges often average about 15- to 30-square kilometers, but may be up to hundreds of sq km in Alaska and Minnesota, and are larger than the home ranges of females. Spatial organization observed prior to low snowshoe hare densities in the Northwest Territories may be described as a land-tenure system, based on prior residency, and may have served to regulate density during peak prey levels (Poole 1995). Home ranges increase, and individuals may become nomadic, when prey is scarce (Ward and Krebs 1985, Saunders 1963, Mech 1980). Long distance dispersal movements of up to several hundred kilometers have been recorded.

Mexican Spotted Owl. [Federal Threatened; Colorado Threatened] The Mexican Spotted Owl occurs in the southwestern U.S. and northern Mexico. There are fairly large number of occurrences, but relatively few are of high quality, and the population trend is probably downward. The total population was at least 800–1500 in the early 1990s (NatureServe 2002, USFWS 1995). This is a high profile species to which a large number of policies and regulations apply.

Its current range is southern Utah (Kertell 1977, Marti 1979) and central Colorado (Webb 1983), south through the mountainous regions of Arizona (Ganey and Balda 1989), New Mexico, western Texas (Guadalupe Mountains), northern Sonora, Chihuahua, and Nuevo Leon (AOU 1983; USFWS 1994, 1995).

The primary threat to the Mexican spotted owl has been alteration of habitat in Arizona and New Mexico as a result of even-aged timber management (USFWS 1995). Habitat continues to be lost or degraded by logging and/or forest fragmentation. This species may be threatened also by the potential for catastrophic fire (heavy accumulations of ground and ladder fuels have rendered many forests vulnerable to stand-replacing fires) (USFWS 1995). Potential for competition with and/or predation by other raptors, including great horned owl and red-tailed hawk (USFWS 1993), needs further study.

Highest densities of Mexican spotted owls occur in mixed-conifer forests that have experienced minimal human disturbance (USFWS 1995, Ganey and Dick 1995). In the southwestern U.S., it is most common where unlogged, closed canopy forests occur in steep canyons. Uneven-aged stands with high basal area and many snags and downed logs are most favorable. In Arizona, this owl occurs primarily in mixed-conifer, pine-oak, and evergreen oak forests. It also occurs in ponderosa pine forest and rocky canyonlands (Ganey and Balda 1989). In Arizona, Mexican spotted owls generally foraged more than or as frequently as expected (based on availability) in virgin mixed-conifer and ponderosa pine forests, and less than expected in managed forests. They roosted primarily in virgin mixed-conifer forests. Both foraging and roosting sites had more big logs, higher canopy closure, and greater densities and basal areas of both trees and snags than did random sites, but the difference was more pronounced in roosting sites (Ganey and Balda 1994). In southern Utah, these owls commonly used mAct tops, benches, and warm

slopes above canyons in fall and winter. Relatively cool canyons were the primary summer habitat (see USFWS 1994). In New Mexico, breeding and roosting occurred in mixed-conifer forests that contained an oak component more frequently than expected by chance. The owls generally did not use pinyon pine-alligator juniper woodlands for nesting or roosting, but selected roost and nest sites in forests characterized by mature trees with high variation in tree heights and canopy closure greater than 75% (Seamans and Gutierrez 1995). Data on wintering habitat is limited for the state of Colorado, however, more general information suggests that the bulk of the Mexican spotted owl population is non-migratory. Where migration does occur, it involves movement to lower, warmer, and more open habitats (NatureServe 2002).

Mexican spotted owls are basically intolerant of even-age forest management practices (USFWS, Federal Register, 1 April 1994). This species requires cool summer roosts (Barrows 1981, Ganey et al. 1993), such as near canyon bottoms, in dense forests, on shady cliffs, or in caves (Ganey et al. 1988). It sometimes occurs in deep canyons in areas that lack extensive forests. This species may sometimes winter in comparatively open habitats at lower elevations. Breeding formerly occurred in desert riparian habitat, but occurrences are rare in this habitat today. In general, foraging habitat requirements for the Mexican spotted owl are not well known (USFWS 1995). However, they clearly forage in a wider variety of forest conditions than they used for roosting. Mexican spotted owls in Colorado tend to forage on more voles due to the mountainous terrain (NatureServe 2002)

Nests are usually located on broken tree tops, cliff ledges, in natural tree cavities, or in trees on stick platforms. Mexican spotted owls will often use the abandoned nest of hawks or mammals, and will sometimes nest in caves. In Utah and Colorado, most nests are in caves or on cliff ledges in steep-walled canyons; elsewhere, nests apparently most often are in trees, especially Douglas-fir (USFWS 1995, Seamans and Gutierrez 1995). These owls exhibit a high level of nest site fidelity. They typically select cool, shady sites with high canopy closure and at least a few old-growth trees, usually on moderate to steep slopes (USFWS 1993). In New Mexico, 61% of nest structures were on clumps of limbs caused by dwarf mistletoe infections. These nest trees averaged 164 years old and 60.6 cm in diameter (Seamans and Gutierrez 1995).

Mountain Plover. [Federal Proposed; Colorado Special Concern] This species breeds from extreme southern Alberta (very low numbers) and, perhaps, Saskatchewan and northern Montana, south to central New Mexico, western Texas, and western Oklahoma, with main breeding areas in Colorado, Wyoming, and Montana (Knopf 1996). It has been speculated that Pawnee National Grassland in Colorado was the historical center of this bird's breeding distribution (Graul and Webster 1976), and that this area plus the Charles M. Russell National Wildlife Refuge in Montana held the majority of breeding birds (Knopf and Miller 1994). Extensive inventory by the Colorado Breeding Bird Atlas, however, has documented many birds in south central and southeastern Colorado. Mountain plovers were recently found breeding in eastern Utah (Day 1994).

The nonbreeding and wintering range of mountain plovers includes the the San Joaquin, Sacramento, and Imperial Valleys of Central California, southern Arizona, central and near-coastal Texas, south to southern Baja California and the northern mainland of Mexico to San Luis Potosi (Knopf and Rupert 1995, Knopf 1996, Gomez de Silva et al. 1996). There are

major concentrations of birds that congregate at staging areas in southeastern Colorado, and central and northeastern New Mexico, prior to migration (Knopf 1996).

A mountain plover status survey indicated recent declines of 50–89% in population size (Leachman and Knopf 1991). Breeding Bird Survey data show an average decline of 3.7% for each year between 1966 and 1993 (Knopf 1996). The breeding distribution has also contracted, with both peripheral populations disappearing and core populations going from widely distributed to only locally present (Knopf 1996).

Early decline probably was related, at least in part, to “market” hunting. Conversion of shortgrass prairie to agricultural land, primarily for winter wheat, has destroyed nesting habitat, as has planting of taller grasses in native prairie (Knopf 1996). Many nests were on prairie dog towns, which have declined 98% in landscape coverage since 1900 (Summers and Linder 1978). In many areas, farms have switched to new crops in the past 25 years, including extensive areas of sunflowers and millet. These fields remain fallow until early May after plovers have begun nesting. Farm equipment destroys many nests when fields are planted in May and many plovers rebuild nests there, later abandoning the nests when the crops become too tall. This shift in crops may explain the observed annual rate of decline since the 1960s (Knopf 1996, Knopf and Rupert 1999). Wintering areas in California are under extreme pressure from conversion of cultivated fields to vineyards, orchards, and urban development, as well as, potentially, environmental contaminants (B. Leachman, pers. comm.; Knopf 1996; Knopf and Rupert 1995).

Nests are made on high plains or shortgrass prairie and desert tablelands. Nest are often built near prairie dog towns in some areas, such as sagebrush/blue grama habitats in central Montana. In central and southwestern Montana, southeastern Wyoming, and northeastern Colorado, nesting often occurs in shortgrass prairie with a history of heavy grazing or in low shrub semideserts. Nesting areas are characterized by very short vegetation, significant areas of bare ground (typically less than 30%, which may be the minimum requirement), and flat or gentle slopes (less than 5%) (Graul 1975, Graul and Webster 1976, Knowles et al. 1982, Olson 1984, Olson and Edge 1985, Olson-Edge and Edge 1987, Knopf and Miller 1994, Knopf 1996). Nests are on the ground in shallow depressions that may be lined with plant material or adjacent to dried cattle dung (Knopf and Miller 1994). Adults often take chicks to windmill/water tank areas to forage (Knopf 1996), but the site around the tank must be dry. This bird generally avoids moist soils.

Preferred non-breeding habitat consists of short-grass plains and fields, plowed fields, and sandy deserts (AOU 1983), and commercial sod farms (New Mexico, Knopf 1996). In southern California, wintering birds preferred heavily grazed native rangelands, but also used burned fields (primarily for night roosting). Alkali flats were the most favored habitat, where available. The use of cultivated land may be a result of loss of native habitats. Native habitats may be critical in fall before freshly cultivated fields become available (Knopf and Rupert 1995).

Greenback Cutthroat Trout. [Federal Threatened; Colorado Endangered] This species occupies a small range in the upper reaches of the South Platte and Arkansas rivers in Colorado and Wyoming. Its numbers had declined with habitat degradation and through effects of introduced trout species; however, the population has increased in recent decades through

successful reintroduction efforts. Historically, greenback cutthroat trout occurred in the sources of the South Platte River and Arkansas River in Colorado, from the headwaters to the foothills, and in a few headwater tributaries of the South Platte in a small area of southeastern Wyoming (Behnke 1992). Currently, in the South Platte drainage, most stable populations are in Rocky Mountain National Park. A few stable populations exist in the Arkansas River drainage (Young and Harig 2001).

The greenback cutthroat trout's decline from its historic distribution was caused by diversion of water for irrigation, water pollution and sedimentation caused by mining and logging, and especially displacement by introduced non-native trout. This species is negatively impacted or eliminated when brook trout are present because juvenile brook trout drive young greenback cutthroat trout into open waters of larger streams, exposing the young fish to predation.

Greenback cutthroat trout habitat includes clear, swift-flowing mountain streams with cover such as overhanging banks and vegetation. Juveniles tend to shelter in shallow backwaters. This species also occurs in lakes (Matthews and Moseley 1990).

Colorado Butterfly Plant. [Federal Threatened] The Colorado Butterfly Plant is a naturally rare plant with a restricted geographic range and high habitat specificity. Studies in Wyoming suggest that the long-term survival of populations or the establishment of new colonies may be dependent on periodic disturbances that maintain short vegetative cover or early seral conditions (Marriott 1987; Fertig 1994). In the absence of such disturbances, habitats may become overgrown with exotic plants or dense, brushy, late successional vegetation. Prior to European settlement, flooding, fire, and bison grazing probably maintained the habitat conditions favored by this species. Some agricultural practices, such as winter or short-rotational grazing, and early or late season mowing, appear to compensate for these processes at many sites in Wyoming (Fertig 1994). Reintroduction of natural disturbance processes (fire, flooding, and grazing) or development of management strategies involving mowing, brush removal, and integrated pest management for weed control have been recommended to maintain and improve Colorado butterfly plant habitat on F.E. Warren Air Force Base in Cheyenne, Wyoming (Fertig 1997, 1998). The maintenance of open habitats for seedling establishment and optimum rosette growth may be critical for long-term survival of populations.

Colorado butterfly plant is an early successional species (although probably not a pioneer) adapted to periodically disturbed, subirrigated stream channels with short vegetative cover, occurring at elevations between 5000 and 6400 feet. Colonies are often found in low depressions or along bends in wide, meandering stream channels, a short distance upslope of the actual channel. Populations are usually found in areas that are intermediate in moisture between wet, streamside communities dominated by sedges, rushes, and cattails, and adjacent dry, upland shortgrass prairie. Historically, flooding was probably the main source of habitat disturbance, although wildfire and grazing may have also been important. In the absence of occasional disturbance, the Colorado butterfly plant's preferred habitat may become dominated by dense growth of willows, grasses, and exotic forbs, preventing new seedlings from becoming established (Floyd 1995 a; Fertig 1998).

Seedling establishment and survival is an equally critical phase, and may be negatively impacted by cold winter temperatures, foliar herbivory, and competition for space and resources from dense native vegetation and exotic plants (Marriott 1987; Fertig 1996). Populations consist of a mix of size and age classes, including first-year seedlings, 2-4 year old vegetative rosettes, and reproductive plants. Long-term population trend studies at F.E. Warren Air Force Base have shown that the number of reproductive plants can vary widely from year to year. Population trends are strongly influenced by past levels of seedling establishment and the survival of larger rosettes, which in turn are influenced by climatic factors and habitat suitability (Fertig 1997, 1998).

APPDENDIX C
STATE LISTED AND MONITORED SPECIES

STATE LISTED AND MONITORED SPECIES

[References are available in Chapter 5.0]

River otter (*Lontra Canadensis*)

The river otter occurs throughout most of North America north of Mexico, except for the extreme southwestern U.S. It was extirpated from large areas of the interior United States following European colonization. Local/regional declines were caused by unregulated trapping and degradation of riverine/riparian habitat. The river otter has been reintroduced in some parts of the range (e.g., Colorado, Virginia).

Streams, lakes, ponds, swamps, marshes, estuaries (in some areas), beaver flowages, and exposed outer coast (Pacific Northwest, Alaska) are all utilized by river otters. When inactive, they occupy hollow logs, spaces under roots, logs, or overhang, abandoned beaver lodges, dense thickets near water, or burrows of other animals. Such sites also are used for rearing young. River otters are highly associated with beaver on Mount Desert Island, Maine (Dubuc et al. 1990). They use traditional haul-out sites along the banks of aquatic habitats, and may travel long distances overland, particularly in snow.

American peregrine falcon (*Falco peregrinus anatum*)

This species has a widespread distribution with a large number of occurrences, many in remote wilderness. The peregrine falcon had been extirpated in the eastern United States and southeastern Canada, and greatly reduced in numbers over many other portions of its range, due to pesticide poisoning. Its numbers are currently increasing and recovery objectives have been met in most areas. However, recovery has been slow in the central prairie states (USFWS 1999). Although threats were primarily environmental toxins, habitat loss, human disturbance, and illegal take were contributing factors.

The American peregrine falcon is found in various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (AOU 1983). In the non-breeding season, this species occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports.

These falcons often nest on ledges or in holes on the face of rocky cliffs or crags. Cliff ledge nests are typically protected by a sheltering overhang (Palmer 1988). River banks, tundra mounds, open bogs, large stick nests of other species, tree hollows, and man-made structures (e.g., ledges of city buildings) are used locally (Cade 1982). Tundra populations nest typically on rocky cliffs, bluffs, or dirt banks. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms.

This species feeds primarily on birds (medium-size passerines up to small waterfowl); but will rarely or locally feed on small mammals (e.g., bats, lemmings).. Lizards and fishes may also be taken. Insects may be taken by young birds.

Barrow's goldeneye (*Bucephalea islandica*)

Barrow's goldeneye breeds in southeastern Alaska, northwestern British Columbia south to eastern Washington, southwestern Oregon, and eastern California; as well as the Colorado Rockies, Quebec, Labrador, Greenland, and Iceland. It winters in southern Alaska, south along the coast to central California (mainly from Washington northward), and locally from southern British Columbia and

northern Montana to northern Nevada, Utah, Colorado, as well as from the Gulf of St. Lawrence south to New York and, rarely, to South Carolina.

This species winters on lakes, rivers, estuaries, and bays. It usually nests near lakes or ponds surrounded by dense vegetation. It may nest in wooded or open country. Nests are usually built in a natural tree cavity, abandoned woodpecker hole, rock cavity, or stream bank. These birds often nest in the same area in successive years.

Ferruginous hawk (*Buteo regalis*)

The ferruginous hawk is widespread and relatively common in the appropriate habitat across most of the western United States and Canada, including the Great Plains region. Reports of local declines, continued loss of habitat, sensitivity to disturbance in prairie forms, and relatively low numbers indicate that this species should be carefully watched and regularly re-evaluated. While local declines have been noted (e.g., Woffinden and Murphy 1989), a widespread decline was not evident as of the early-1990s (USFWS 1992, Olendorff 1993).

Some habitat has been lost due to agricultural development. Schmutz and Schmutz (1980) reported that habitat in the breeding range in Canada has been severely depleted by agriculture and by forest invasion (see also Jensen 1995). Recent trends, however, suggest relative stability (Schmutz 1995). The loss of grassland is not regarded as an immediate threat (USFWS 1992), but is likely a long-term threat (Olendorff 1993). The ability of native grasslands and shrublands to support viable populations may be compromised by the invasion of exotic annuals, especially cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola iberica*). However, conversion of large areas of dense shrublands to grasslands may locally benefit ferruginous hawks.

Ferruginous hawks are easily disturbed during the breeding season (Olendorff 1973, Gilmer and Stewart 1983, Schmutz 1984, White and Thurow 1985, Bechard et al. 1990). Abandonment of nests occurs more often in the early stages of nesting (Gilmer and Stewart 1983, White and Thurow 1985). In eastern Colorado, nests in remote locations had greater productivity compared to more accessible nests (Olendorff 1973). Poisoning of prey species may be a threat, both directly to hawks eating poisoned animals, and indirectly through reduction of prey base—especially at prey concentration areas such as prairie dog colonies.

These hawks utilize open country, primarily prairies, plains and badlands. They are also found in sagebrush and saltbush-greasewood shrublands, and along the periphery of pinyon-juniper and other woodlands. In the southern Great Plains, they are common at black-tailed prairie dog colonies in winter (Schmutz and Fyfe 1987). Nests are found in tall trees or willows along streams or on steep slopes, in junipers (Utah), on cliff ledges, river-cut banks, and hillsides, and on power line towers. Nests are also sometimes established on sloped ground on the plains, or on mounds in open desert. Ferruginous hawks generally avoid areas of intensive agriculture or human activity. High elevations, forest interiors, narrow canyons, and cliff areas are also avoided (Janes 1985, Palmer 1988, Black 1992). In eastern Colorado, these hawks nested more frequently in grassland areas than in cultivated areas (Olendorff 1973).

Greater sandhill crane (*Grus Canadensis*)

Greater sandhill cranes breed in northeastern Siberia, northern Alaska, and middle arctic Canada (to Baffin Island), south locally to northeastern California, Nevada, Wyoming, Colorado, South Dakota, Illinois, and Michigan. This species formerly occurred south to Nebraska, Indiana, and Ohio as well as from southern Mississippi, Alabama, and Georgia south through Florida to Cuba and the Isles of Pines. It winters in the southern U.S. south to northern Mexico and Cuba.

Greater sandhill cranes are threatened by loss and degradation of wetland habitats. Collisions with powerlines have been noted as a significant source of mortality in the Rocky Mountains. The breeding population in southern and southeastern Oregon and northeastern California is threatened by high levels of nest and chick predation by ravens, coyotes, and raccoons, though predator control efforts have somewhat alleviated the threat (Johnsgard 1991, Littlefield 1995). Breeding populations of greater sandhill cranes disappear from areas of heavy human use.

Breeding habitat includes open grasslands, marshes, marshy edges of lakes and ponds, and river banks (Terres 1980). Nests are established on the ground or in shallow water on open tundra, large marshes, bogs, fens, or wet forest meadows. These cranes exhibit high fidelity to breeding territories (see Littlefield 1995). When not breeding, they roost at night along river channels, on alluvial islands of braided rivers, or natural basin wetlands. A communal roost site consisting of an open expanse of shallow water is a key feature of wintering habitat. Along the North Platte River in spring, roosts are generally in shallow water (< 20 cm), 11-50 m from the nearest visual obstruction, and away from paved or gravel roads, dwellings, and bridges (Norling et al. 1992). Sandhill cranes migrating in spring through interior Alaska often roost on river overflow ice of the Tanana River or on the ice of ponds and lakes (Johnsgard 1991). Often feeds and rests in fields and agricultural lands.

Long-billed curlew (*Numenius americanus*)

The breeding range of this species includes southern British Columbia, southern Alberta, southern Saskatchewan, southern Manitoba south to eastern Washington, northeastern California, Nevada, Utah, southern Colorado, New Mexico, and northern Texas east to southwestern Kansas. It has probably been extirpated from southern Manitoba and southeastern Saskatchewan (De Smet 1992). The non-breeding range is central California, southern Arizona (rarely), extreme northern Mexico, southern Texas, southern Louisiana, coastal South Carolina south to southern Mexico (Oaxaca, Veracruz, Yucatan Peninsula) and northern Gulf Coast east to Florida. It winters irregularly in Guatemala, Honduras, Costa Rica, and Venezuela.

The long-billed curlew's breeding habitat is prairies and grassy meadows, generally near water (AOU 1983). Nests are on the ground, usually in flat area with short grass (but sometimes on more irregular terrain), and are often near rocks or other conspicuous objects. In Wyoming, they often nest near manure piles if available (Cochran and Anderson 1987). In northern Utah, nests tended to be in small patches of short vegetation near barren ground (Paton and Dalton 1994). Non-breeding habitat used during migration and in winter includes beaches and mudflats (AOU 1983).

Plains sharp-tailed grouse (*Tympanuchus phasianellus jamesii*)

This species is widespread in western North America, but has disappeared from large portions of the historic range. This reduction has been mainly due to habitat loss/degradation resulting from agricultural practices, livestock overgrazing, and habitat succession. These threats remain significant.

The plains sharp-tailed grouse resides locally from Alaska and the Yukon east to western Quebec, south to eastern Washington, eastern Oregon, southern Idaho, Utah, Colorado, northeastern New Mexico (at least formerly), Nebraska, eastern South Dakota, eastern North Dakota, Minnesota, Wisconsin, and northern Michigan. It formerly occurred further south to southern Oregon, northeastern California, northeastern Nevada, western Kansas, southern Iowa, northern Illinois, and probably northern Texas (AOU 1983, Connelly et al. 1998).

Historic conversion of native habitat to private cultivation is cited as a major contributor to the declines (Buss and Dziedzic 1955, Kessler and Bosch 1982) of plains sharp-tailed grouse populations. Natural succession of grasslands and shrublands to forests, accelerated or expanded geographically by artificial fire regimes, have influenced habitat quality and populations in several regions. Habitat and distribution

is constrained in regions where fire suppression has reduced early and mid-successional vegetation communities. Encroachment of aspen into prairie habitat has reduced the number of leks in southwestern Manitoba (Berger and Baydack 1992). Some types of prairie and shrub-steppe habitats protected from fire are readily colonized by evergreens which degrade habitat quality. Various evergreen trees (*Pinus* spp., *Pseudotsuga mensezii*, *Juniperus* spp.), and fewer deciduous species (*Quercus* spp., *Betula* spp.) aggressively compete with shrubs, grasses and forbs, and dominate sites—contributing to increased avian predation. At the landscape level these vegetation changes fragment and isolate habitats and populations (Berg 1990, Manley and Wood 1990, Dickson 1993). Over-grazing by domestic livestock is the activity most frequently attributed to causing declines, especially where it degrades habitat by reducing residual cover necessary for nesting, brood rearing, and predator evasion (Kessler and Bosch 1982). Kessler and Bosch (1982) surveyed biologists who manage this species and found that grazing intensity and subsequent effects on residual cover were overwhelmingly identified as the major conflict in conserving the species.

The plains sharp-tailed grouse requires a mosaic of dense grass and shrubs with rich forb and insect foods during nesting and brood-rearing. During winter it often relies on riparian areas and other sites that support deciduous trees and shrubs for feeding, roosting, and escape cover. It will also utilize non-native cultivated grains and hedgerow species.

Western burrowing owl (*Athene cunicularia*)

This species occurs in southern Utah (Kertell 1977, Marti 1979) and central Colorado (Webb 1983), south through the mountainous regions of Arizona (Ganey and Balda 1989), New Mexico, western Texas (Guadalupe Mountains), to northern Sonora, Chihuahua, and Nuevo Leon, and then south again to Michoacan and Puebla (AOU 1983; USFWS 1994, 1995).

This species is declining in Arizona, California, Colorado, Kansas, Nebraska, Nevada, Utah, and Washington (James and Espie 1997). No western states or provinces report increasing populations (James and Espie 1997). This species is declining in the Great Plains of the U.S. where it is strongly associated with prairie dog (*Cynomys* spp.) towns, which have been greatly reduced by cultivation and poisoning.

The primary threats across North American, including Mexico, are habitat loss and fragmentation—primarily due to intensive agricultural and urban land conversion—and habitat degradation due to control and extermination of colonial burrowing mammals (Dundas and Jensen 1995, Haug et al. 1993, Rodriguez Estrella et al. 1998, Sheffield 1997). The dramatic 98% reduction of prairie is linked to the reduction of the overall burrowing owl population (Evans 1982). Fragmentation and isolation are threats to small and localized populations that may be more prone to extinction.

Optimum habitat is typified by short vegetation and the presence of fresh small mammal burrows (Zarn 1974). These owls are found in open grasslands, especially prairies, plains, and savannas, but also sometimes in open areas such as vacant lots near human habitation (e.g., campuses, airports, golf courses, perimeter of agricultural fields, banks of irrigation canals). In the Northern Great Plains of the U.S., they preferred grassland on aridic ustoll and typic boroll soil types where vegetation was heavily grazed by small mammals (Kantrud and Kologiski 1982). In Canadian prairies, burrowing mammals and owl habitat was associated with lacustrine soils (Wellicome and Haug 1995). Burrowing owls spend much of their time on the ground or on low perches such as fence posts or dirt mounds.

White pelican (*Pelicanus erythrorhynchos*)

There are about 70 breeding colonies of white pelicans, with most in Canada. Many of the breeding colonies in the U.S. and Canada seem highly threatened by habitat loss and water level problems. This

species breeds locally, now primarily in Prairie Provinces (Alberta, Saskatchewan, and Manitoba), but also in adjacent eastern British Columbia and western Ontario, south through California, Nevada, Utah, Colorado, South Dakota, and Minnesota, as well as coastal Texas and Tamaulipas. It breeds sporadically in Durango, Mexico (Johnsgard 1993, Evans and Knopf 1993). Over half of the breeding population nests in Saskatchewan and Manitoba. The non-breeding range includes Florida, the Gulf of Mexico coast to Tabasco and Yucatan, and central California south to southern Baja California and the west-central mainland of Mexico. White pelicans sometimes winter as far south as Guatemala, Nicaragua, and Costa Rica (AOU 1983, Evans and Knopf 1993). In North America, the highest winter density occurs in southern Texas (Root 1988). Other important wintering areas include the Gulf coast and Everglades region of Florida.

Breeding colonies have low tolerance to disturbance and are highly susceptible to predation. They are also susceptible to pesticide contamination. Breeding colonies are threatened by loss of breeding and feeding areas (Wyoming, Findholt and Diem 1988). The largest U.S. breeding colony on Anaho Island in Pyramid Lake, Nevada, does not provide adequate food (as a result of wetland losses to irrigation projects). Pelicans at this site must fly some 60 miles one-way to forage on prey that is increasingly scarce and contaminated with arsenic, selenium, mercury, and boron (Ehrlich et al. 1992). Ehrlich et al. (1992) noted that several nesting colonies recently were jeopardized by several consecutive years of drought, which may lower water levels and allow mammal predators access to pelican breeding sites. Disturbance and shooting by humans are problems in some areas (see Johnsgard 1993).

Habitats utilized by white pelicans include rivers, lakes, reservoirs, estuaries, bays, marshes, and, sometimes, inshore marine habitats. They rest on islands and peninsulas. Their nests are usually built on islands or peninsulas in brackish or freshwater lakes that are isolated from mammalian predators. Ground nests are usually in a slight depression or on a mound of earth and debris and are typically 24–36 inches across and 15–20 inches high (Terres 1980). Nests are usually placed on low flat, or gently sloping terrain, and in the open but near vegetation, driftwood, or large rocks (Spendelow and Patton 1988).

Northern leopard frog (*Rana pipiens*)

The northern leopard frog has a large range that extends throughout much of the U.S. and southern Canada. It is still common in many areas and in a diverse array of pristine and disturbed habitats. Populations have declined in some areas due to habitat loss and degradation, overexploitation, interactions with non-native species, and unknown causes; but the overall range remains essentially undiminished.

Threats and degree of threat vary greatly across the range. Threats include habitat loss, commercial overexploitation, and, in some areas, probably competition/predation by bullfrogs or other introduced species. Decline in the Rocky Mountains region is not due to acidification of breeding habitats (Corn et al. 1989, Corn and Vertucci 1992). Laboratory results suggest that there may be an interaction between crowding, temperature, and mortality from bacterial infection (e.g., red-leg disease) as there was higher mortality when frogs were subjected to crowding and high temperatures (Brodtkin et al. 1992). In Ontario, Canada, leopard frog population density was negatively affected by vehicular traffic within a radius of 1.5 km (Carr and Fahrig 2001).

Northern leopard frogs occur in springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes. They are typically associated with permanent water with rooted aquatic vegetation. In summer, these frogs commonly inhabit wet meadows and fields. They take cover underwater, in damp niches, or in caves when inactive. Northern leopard frogs usually overwinter underwater.

Common shiner (*Luxilus cornutus*)

The common shiner occurs on the upper half of the Atlantic slope, in most of the Great Lakes drainage, in the Missouri and upper Mississippi river basins, and in the southern extreme of Hudson Bay drainage (Red River of North system only). It also occurs across the southern tier of Canadian provinces to Saskatchewan, and south from Canada to Colorado, Oklahoma, and Missouri, and across to Virginia.

The common shiner occupies creeks and small to medium rivers with clear, cool, weedless water, moderate to swift current, gravel to rubble bottom, and alternating pools and riffles (usually avoids riffles). It also inhabits lakes and reservoirs, especially in the north. It occupies turbid waters in the Great Plains. Common shiners spawn over gravel beds in running water, in nests made in gravel by males in running water, or in nests of other species in running or still water. (NatureServe 2002)

Iowa Darter (*Etheostoma exile*)

The Iowa darter inhabits the St. Lawrence-Great Lakes, Hudson Bay, and Mississippi River basins from southern Quebec to northern Alberta, south to Ohio, Illinois, and Colorado (Page and Burr 1991). It has been extirpated from many localities in the southern part of its range. The Iowa darter occurs farther west and north than any other darter. However, this species has declined in some areas (e.g., Illinois) due, probably, to habitat degradation caused by pollution, drainage of wetlands, and introductions of non-native species (Herkert 1992).

The Iowa darter is capable of utilizing clear, sluggish, vegetated, headwaters, creeks, and small to medium rivers, and weedy portions of glacial lakes, marshes, and ponds. The typical substrate is sand, peat, and/or organic debris. This species occupies deeper lake waters and stream pools when not breeding. It spawns in shallow waters of lake margins and quiet areas of streams. The eggs are laid on submerged roots or debris, or occasionally on gravel and sand (Page 1983, Becker 1983).

Lake Chub (*Couesius plumbeus*)

The lake chub is the most northern minnow in North America, and the only minnow in Alaska (Page and Burr 1991). Its range extends from eastern Alaska to Labrador and Nova Scotia, south to the Columbia River drainage of Washington, the Platte River system of Colorado (Bestgen et al. 1991) and Nebraska (Stasiak 1986), the Great Lakes region, the Delaware River of New York, and across northern New England. The species is common throughout much of its range (Page and Burr 1991). However, it appears to no longer occur in the upper Mississippi River system of Iowa, which it formerly inhabited.

The lake chub occurs in varied habitats including standing or flowing water in large or small bodies of water. It is most common in gravel-bottomed pools and runs of streams and along rocky lake margins (Page and Burr 1991). While this species is more common in lakes in the southern portion of its range, and in rivers in the northern part, it will also occupy lakes in the northern section of its range. Lake chub are often found in shallow water, but may move into deeper parts of lakes in summer. This species spawns in river shallows, along rocky shores, and in shoals of lakes. Lake chub may migrate up to 1.6 km (1 mile) upstream from lakes to spawning areas (Becker 1983).

Northern redbelly dace (*Phoxinus eos*)

Northern redbelly daces range extends across the Great Lakes, Hudson Bay, the upper Mississippi, Missouri, and Peace-Mackenzie river drainages, from Nova Scotia west to Northwest Territories and British Columbia, and then south to northern Pennsylvania, Wisconsin, Nebraska, and Colorado (Page and Burr 1991). While common across most of its range, the southern-most population in Colorado has

been reduced by stream channelization, reductions in discharge, and changes in water quality, and is now threatened by continued urban development (Bestgen 1989).

Habitat for the northern redbelly dace includes boggy lakes, ponds, beaver ponds, and pools of headwaters and creeks. It is often found in tea colored water over fine detritus or silt; usually near vegetation (Lee et al. 1980, Page and Burr 1991). This species spawns among mats of filamentous algae or aquatic plants (Faber 1985).

Plains Minnow (*Hybognathus placitus*)

While the plains minnow is moderately widespread in streams in central North America, it has undergone substantial declines in abundance and distribution in some areas (Kansas, Nebraska, Missouri, and portions of Oklahoma). This species is declining in the southern half of its range while being apparently stable in the northern portions of its range.

The plains minnow is threatened by impoundments altering habitat and flow regimes. The elimination of highly variable water levels, unstable streambeds, and fluctuating water temperatures are among the reasons for declines (Cross et al. 1985). The Northern Prairie Research Center (1995) indicated that the greatest threats are nonpoint source pollution and main stem impoundments impacting natural flow regimes, and other threats across the range include dewatering of rivers from irrigation and degradation of riparian areas. Damming of the North Fork of the Red River in southwestern Oklahoma may have eliminated populations above the dam (Winston et al. 1991). Threatened in New Mexico by impoundments and dewatering this species has possibly been eliminated above Ute Reservoir on the Canadian River (Bob Larson, pers. comm., 1998). According to Eberle (1995), declines in Kansas might be tied to changes in flow regimes of rivers following dam construction and dewatering.

The plains minnow occupies silt-laden rivers, slower water, and side pools of silty streams. Large streams and rivers over beds of sand and silt with some current support this species (Lehtinen and Layzer 1988). Clear to highly turbid rivers and creeks with sandy bottoms, high levels of dissolved solids, and slight to moderate erratic flows (Sublette et al. 1990) are typical for this species. Eggs are probably scattered over silt-bottomed backwaters. This species is considered possibly extirpated in Colorado by some experts (NatureServe 2002).

Plains topminnow (*Fundulus sciadicus*)

This species has a somewhat localized distribution in two disjunct areas: the Missouri River basin in Nebraska and closely adjacent parts of northeastern Colorado, eastern Wyoming, southern South Dakota, northeastern Iowa, and extreme southwestern Minnesota; and in the Missouri River drainage in central Missouri and Neosho River system in southwestern Missouri, extreme southeastern Kansas, and northeastern Oklahoma (Page and Burr 1991; Sharron Nelson, pers. comm., 1998). In Nebraska, the plains topminnow occurs across most of the state north of the Platte River (Stasiak 1987) and in the Republican River in the southwestern portion of the state (Lee et al. 1980), but is most common in the Sandhills (Stasiak 1987). In Minnesota, it is found in the Rock River (Sharron Nelson, pers. comm., 1998). In Colorado, this species occurs throughout the Platte River Basin and has been accidentally stocked in the White River. (NatureServe 2002). In Missouri, it occurs along the northwestern margin of the Ozarks from Shoal Creek northeastward to the lower Osage and Gasconade rivers (Pfleiger 1975). In Kansas, it is known from a backwater of Shoal Creek, in Cherokee County (Bill Busby, pers. comm., 1998). In Oklahoma, the plains topminnow is known from Delaware and Mayes counties (Caryn Vaughn, pers. comm., 1998).

Some population losses or range retractions have occurred in Missouri and on the periphery of the northern portion of the plains topminnow's range. Most Missouri occurrences consist of one to two

individuals. The species is considered common in Nebraska. Although it was found at 13 stations during a 1989–1995 survey of 32 sites (based on 49 sampling visits) on the North Platte and South Platte rivers in southwestern Nebraska, it was not common at any of the stations. However, it was abundant in many streams entering the North Platte and South Platte rivers (Lynch and Roh 1996).

The threats to this species are not well known, but may include impoundments, channelization, agricultural runoff, dewatering, siltation, and introductions of *Gambusia affinis* (Fair 1996; Lynch and Roh 1996; Janet Sternburg and Sharron Nelson, pers. comm., 1998). The range of the suckermouth minnow includes the Mississippi River basin from Ohio and West Virginia, to Wyoming, Colorado and New Mexico, and from southeastern Minnesota to northern Alabama and southern Oklahoma, as well as the western Lake Erie drainage in Ohio. There are isolated populations in Gulf Coast drainages (Sabine Lake, Louisiana and Texas; Galveston Bay, Texas;) as well as in the Colorado River of Texas, and the upper Pecos River in New Mexico. While it is common throughout most of its range, it is rare in Gulf drainages (Page and Burr 1991).

Plains topminnows occupy clear, sandy to rocky, spring-fed streams and creeks, and small to medium rivers with moderate to rapid current. They occur in quiet pools and backwaters and overflow pools of larger streams in Missouri; usually near vegetation.

Suckermouth minnow (*Phenacobius mirabilis*)

The range of the suckermouth minnow includes the Mississippi River basin from Ohio and West Virginia, to Wyoming, Colorado and New Mexico, and from southeastern Minnesota to northern Alabama and southern Oklahoma, as well as the western Lake Erie drainage in Ohio. There are isolated populations in Gulf Coast drainages (Sabine Lake, Louisiana and Texas; Galveston Bay, Texas;) as well as in the Colorado River of Texas, and the upper Pecos River in New Mexico. While it is common throughout most of its range, it is rare in Gulf drainages (Page and Burr 1991).

Plains forms of this species appear to tolerate moderate turbidity. Suckermouth minnows occupy runs and riffles of creeks and small to medium (sometimes large) rivers, with substrates ranging from sand and gravel to large boulders (Sublette et al. 1990, Page and Burr 1991). This species presumably spawns over gravelly riffles.

Species Tracked by the Colorado Natural Heritage Program

Insects

Arogos Skipper (*Atrytone arogos iowa*)
Hop's Feeding Azure (*Celastrina humulus*)
Ottoe Skipper (*Hesperia ottoe*)
Moss's Elfin (*Callophrys mossii schryveri*)
Mottled Dusky Wing (*Erynnis martialis*)
Regal Fritillary (*Speyeria idalia*)

Vascular Plants

American Currant (*Ribes americanum*; also known as Wild Black Currant)
Bell's Twinpod (*Physaria bellii*)
Dwarf Milkweed (*Asclepias uncialis*)
Forktip Three-awn (*Aristida basiramea*)
Dwarf Wild Indigo (*Amorpha nana*)
Pictureleaf Wintergreen (*Pyrola picta*)

Prairie Violet (*Viola pedatifida*)
Rattlesnake Fern (*Botrypus virginianus europaeus*)
Rocky Mountain Cinquefoil (*Potentilla rupicola*)
Showy Prairie Gentian (*Eustoma grandiflorum*)
White Adder's-mouth (*Malaxis monophyllus*)
Wood Lily (*Lilium philadelphicum*)
Yellow Lady's-slipper (*Cypripedium calceolus parviflorum*)

